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AUGUST 13, 1887.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXII. GELATINE EDITION NO. 607.

ARCHITECTVRE

ENGINEERING

DECORATION

CONSTRVCTION

TICKNOR & COMPANY

BOSTON MASS.

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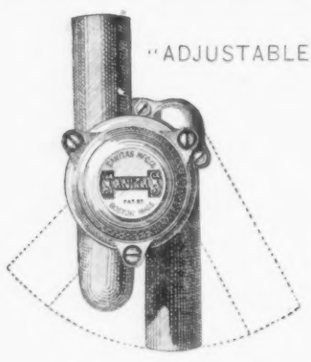
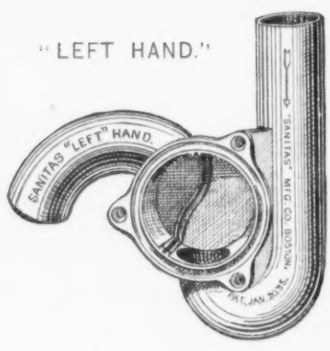
THE SANITAS TRAP.

"RIGHT HAND."


"ADJUSTABLE."



"LEFT HAND."

SOME FACTS AND SOME FANCIES
ABOUT THE SANITAS TRAP.

I. It is sometimes asserted that the seal of the Sanitas Trap can never be broken under any conditions. This is erroneous. Its seal can be pumped out by a force-pump, or by *Laboratory plumbing apparatus*, especially devised to destroy the seals of traps by siphonage. But the seal of the unvented Sanitas Trap *never can be and never has been destroyed by siphonage in good plumbing work*. Furthermore, the unvented Sanitas Trap will stand a severer test of siphoning action than will the vented S-trap. This has been demonstrated over and over again, and the demonstration can be repeated at any time to the satisfaction of any who are interested, provided care be taken to vent the S-trap in a manner *which is practical in plumbing*, using a vent-pipe of the size, length, and average number of bends found in ordinary practice. The seal of the Sanitas Trap will be *lowered* by severe siphoning action, *but it cannot be broken*. II. Again it is sometimes asserted that the Sanitas Trap cannot be clogged. This is also erroneous. The trap can be clogged by matches or kitchen refuse, if improperly used, just as can any ordinary waste-pipe; but when properly set and used the Sanitas Trap will never become clogged to the point of losing its effectiveness. If improperly used, as when under kitchen sinks the cook takes out the sink-strainer and sweeps into the trap bones and refuse never intended for the waste-pipe, the Sanitas Trap will be fouled; but it then *has the great advantage over all others of providing the easiest and safest means of removing this refuse matter*, and that with the aid of an ordinary screw-driver. When used under sinks the trap should be placed close to the sink outlet, and the sink strainer should never be removed. The grease will then pass through the trap in a liquid state and be caught in the suitable grease receptacle beyond. The efficiency of the Sanitas Trap will then remain intact indefinitely, while other traps, like the old-fashoned "D" trap, or its modern representatives, the "Bottle," "Round," and "Pot" traps, have bodies so much larger than their inlet and outlet arms, that they obviously cannot be scoured by the water when it passes through them. III. It is often thought that where special trap vent-pipes are called for, the Sanitas Trap is not needed. Precisely the opposite is the fact. All sanitarians now admit that whether the trap vent-pipe be used or not, *the trap itself should be anti-siphonic*, since the vent alone cannot always be relied upon. The mouth of the vent-pipe is often clogged, under sinks, by grease, since it is never scoured, and the friction due to its bends, and to the disproportion between its capacity and its length, often destroys its efficiency as an air supply. The Sanitas Trap is so constructed that its seal cannot be injured by evaporation produced by trap venting. Therefore, *where trap-vent pipes are called for the use of the Sanitas Trap is particularly necessary*. In virtue of the peculiar construction of the Sanitas Trap, *its outlet-pipe forms its own vent-pipe*, which is infinitely better than a special vent-pipe, inasmuch as it is always kept open by the scouring action of its own discharges. But even if it should ever become closed by grease, no harm could come in this case, since the same closure would not only shut off sewer-gas and siphonage, but also at once announce itself and be removed. IV. Finally, the seal of this trap can never be destroyed by *back-pressure*, in properly arranged plumbing. For with the main soil-pipe vented as it should be, no back-pressure can be generated strong enough to do mischief, where ordinary care and intelligence are used in originally laying out the work. For further explanations on this matter see the circulars and other publications of the

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THE Annual Report of the Massachusetts Bureau of Statistics of Labor for 1886 contains more than its usual amount of interesting matter. This is not saying very much, for worse padded specimens of literature than the series it was never our misfortune to see, but in the present instance it is possible to pick out from the mass of double-leaded eulogy of persons connected with the Bureau, and rambling, inconsequent observations on the subject-matter of the few statistics presented, some facts of value. Among these the most valuable are those relating to coöperative enterprises. In the book two separate chapters are devoted to these, one entitled "Coöperative Distribution," and the other "Profit Sharing," as if it had been intended to speak in the first only of the associations for selling groceries and other articles to members at reduced prices which are so popular in England; but this chapter contains a good deal belonging properly to the other, particularly a table showing the present condition of some of the French productive societies of the kind. We could excuse this being in the wrong place if it were as good as it might be, for the recent history of coöperative production in France is of the greatest interest and importance, but the table is confined to the Parisian societies, is poorly translated, "*terrassiers*" being rendered "terrace-makers," and "*sculpteurs*" as "sculptors," and most of the interesting details, such as the rate of dividends paid, are left out, so that we learn almost nothing from it except the fact that there were, when the table was compiled, at least seventy-four such societies in Paris, without counting the powerful building syndicates, of which we find only one mentioned, and that a very small one.

THE story of the real societies for coöperative distribution is familiar to most persons, and the Report does not give a remarkably good abstract of it, or very valuable comments on it, but we can glean something. Aside from the enormous development of the business of such associations, which in 1883 had six hundred and eighty thousand members in Great Britain, and sold one hundred and forty million dollars' worth of goods, with a net profit of eleven million dollars, the most interesting detail which we find is a short account of the first successful enterprise of the kind in England, the "Rochdale Pioneers," which began business in 1844 with twenty-eight members and a capital of one hundred and forty dollars, and, under the management of poor weavers, has now reached an annual business of nearly a million and a half dollars, and has a million and a quarter of invested surplus, and, besides spending regularly more than five thousand dollars a year for charitable purposes, pays an average dividend of over fourteen per cent to its members. Reasoning from the English examples, the writer of the report says, rather hastily, as it seems to us, that, although "in the United States the isolated store must miss the valuable help which the English stores have in the organization that has grown up as the movement in that country has gained strength," still, "if stores were to multiply in America the same organization would follow here, and, meantime, the recorded experience of English effort, if availed of among us, would prevent serious errors in the conduct of business." This has a plausible air, and it would be very pleasant if it were true, but the English statistics do not contain all the data required, and we would not advise any one to risk money in a coöperative store in this country at present. One of the sort, which, by the way, the Report does not mention, was started in Boston two or three years ago. It struggled along for a time and then failed, and we remember hearing at the time a comment, which contains food for thought, by a sensible business man, who observed that in England for many years nearly all retail business had been done on what we should call long credit, and the system of the coöperative stores, which gave no credit at all, brought them at once the immense business advantage which a retailer with only cash customers has over competitors loaded with bad debts and uncollected bills, and they have prospered accordingly. Among us the case is very different. Nearly all retail business in groceries and supplies is done for cash or on short credit, and a coöperative store managed on the same system must compete on equal terms with rivals having at the start certain advantages instead of disadvantages, so that, although one would not like to say that an American coöperative store could not succeed, the road to success appears to be here a good deal longer and harder than exceptional circumstances have made it in England.

IN respect of associations for production, we are much more nearly on an equality with the rest of the world, so far as favorable circumstances are concerned, and experience shows that we are likely to hold our own before long with any country, unless, perhaps, France, where the principle of coöperation and participation in profits has been taken up by the Government and people with that almost religious fervor with which the French adopt a great idea. It is much to be wished that a good history of profit-sharing in France might be published in this country. Something is known here about the principal facts; but the details of the various movements, which would be full of instruction, are almost entirely wanting. The Massachusetts Report is very defective, even in what it pretends to give. Something is said about the Leclaire experiment, the Paris and Orleans Railway Company, the Bord piano-manufactory, and the Chaix printing-office; but we find nothing about the scores of more modest establishments which furnish the examples most needed among us, or about the syndicates, composed entirely of workmen, which now carry on a very large amount of manufacturing business in France. These would be the most interesting examples of all. There is a very common idea that working-men lack entirely the judgment and training needed for business success, and that coöperative shops are sure to fail, for want of the guiding care of some person of mercantile instincts, entrusted with the sole control of their affairs; or, to put it in the other form in which it often appears, that participation schemes can only work well so long as the proprietors of the business keep the reins in their own hands; and that any plan under which the persons employed are allowed to share the responsibility, as well as the profits, of management, is sure to end in disaster. The question whether this notion is well founded or not is certainly the most important one that the subject now presents; and the existing examples have become sufficiently numerous to afford statistics of great value, which might be collected without much difficulty, and would be far better worth publishing than the undigested mass of excerpts from popular books, of not too recent date, which constitute a large part of the Report. For our own part, we have never been so much impressed by the wisdom and prudence, to say nothing of the honesty, prevailing in the business world as to believe it impossible for sensible mechanics to sell the boots or furniture which they made without falling headlong into financial ruin; and, although we suspend our judgment until some one furnishes us with more facts than are at present available, we find

a certain comfort in the evidence which we can incidentally obtain from the Massachusetts Report. Although this contains next to nothing about the financial success of any of the numerous French societies, we find, singularly enough, indications of encouraging experiments carried out in Italy, among people who are generally supposed to be sunk in lethargic barbarism, and in England, which some sage not long ago pronounced to be a country unfitted by nature for coöperative production. In Italy the most interesting associations seem to be those formed among laborers — a class so ignorant that even among us they are regarded as incapable of doing anything except under surveillance of an overseer, while the success of a Southern planter in training large baboons to take the place of the men whom he formerly employed has been gravely commented on throughout the country. The Italian laborers certainly do not appear the most intelligent of their kind, yet they have had sense enough, in certain districts, to form a number of coöperative associations, which take large contracts for earthwork or grading, and sub-let them in sections to their own members, who work by the piece. As no capital is required, except for shovels, pickaxes and wheelbarrows, the cost of shares is small, and the piece-work system makes it easy for the men to appreciate the benefits of putting thought and energy into their labor. They have been tolerably quick to learn the lesson, and the average earnings of the members of the associations, who have to compete for contracts with the private individuals who, as we are told, alone possess the business training necessary for financial operations, earn, on an average, three times as much as they did while working under private contractors. It is hardly necessary to say that such prosperity attracts members, and a Ravenna society grew from three hundred to three thousand within a year. In England, although coöperative distribution has reached a far greater growth than coöperative production, an immense amount of factory stock has quietly passed into the hands of operatives, the spinning factories at Oldham, for instance, being mainly owned by the workmen, about ten thousand of whom hold shares in the various mills, while many manufacturing establishments are conducted entirely on the coöperative plan. Most of these have grown out of coöperative distributing associations and are rather small affairs, although one of them sells a quarter of a million dollars' worth of calicoes annually. No details are given, unfortunately, of their financial success, but we get a curious hint, in the shape of a rule existing in a large number of them, by which the regular customers of the establishment, as well as the stockholders, share in the profits. This idea is undoubtedly a reminiscence of the distributing society from which they sprang, and at first sight appears rather absurd; but a society of workmen, carrying on business with a small capital, could hardly devise a better means of advertising themselves, and bringing about them a set of reliable customers, who would have an interest in extending their connection, in treating them with forbearance in case of accident or press of work, and even in helping them through slight financial difficulties.

Of American examples of profit-sharing we find very few, and trust that the subject will be taken up again next year, with special attention to the recent instances of the *Herald* Publishing Company in Boston, the Batterson Stone Works at Westerly, R. I., Mr. Lewis H. Williams's Building-Shop in New York, the Wanamaker establishment in Philadelphia, and the many other experiments on a great scale which are now in operation. The principal example mentioned is that of the Pillsbury Flour-Mills at Minneapolis, an enormous establishment, with an income of eighteen million dollars a year, in which, after paying current expenses and interest on capital, a certain percentage of the residue is divided annually among those employés who have been in the establishment more than five years or who occupy positions of special trust and responsibility. As a very large number of men is employed, the participation is not extended to all indiscriminately, but is thus held out as a prize for faithfulness and intelligent devotion to work, and a very handsome prize it is, the dividend last year, in addition to the regular wages, which are said to be the highest paid in any mills in the country, having been fifty per cent of the entire year's wages for the five-year class, and sixty-five per cent for those who had held responsible posts. In the same city many small coöperative barrel-factories are said to have been recently established, and it will be interesting to learn whether they share in the vigorous growth of the flour-mill near them. Of the strictly coöperative factories existing when the report was written, ten were in Massachusetts, and were engaged in making either boots and shoes, or furniture, or iron castings, and ample information is given in regard to them. Of the three iron foundries, one had paid ten per cent dividends for four years, besides high wages, some of the moulders having received, besides their dividends, nearly two thousand dollars a year. The next had paid six per cent annually for four years, besides good wages, and the least successful paid three per cent. Of the two chair-factories, one had made good profits for eight years, using them partly to pay five or six per cent dividends and partly to increase capital and replace plant destroyed by fire, while the other, though paying wages and expenses and keeping solvent, had not reached a dividend-paying basis. The shoe-factories, which complete the list, have been most successful of all, one having paid for eleven years dividends varying from six to forty per cent on a capital of twenty thousand dollars, besides wages and expenses, and the only other factory described which had been in existence more than three years, had paid from ten to twenty-five per cent for the last five years, while the younger ones, although some of them had not paid any dividend, were rapidly increasing their business. In all these the managing officers have been chosen by the operative stockholders, and were in some cases themselves operatives, and their success certainly does honor to their capacity.

After several years of talking, preliminary steps have actually been taken in Buffalo for utilizing the water-power of the Niagara River, by the circulation of a paper which pledges the signers to contribute toward a fund of one hundred thousand dollars, which is to be offered as a prize for the best plan for making the force of the river available for use. It is estimated that the power developed by the cataract of Niagara and the rapids just above it is about a million and a half horse-power; and it has the inestimable advantage of being nearly constant, the flow over the fall, supplied, as it is, by the vast reservoirs of the lakes, being hardly affected by the change of seasons, or by a heavy rainfall, and it is not surprising that the practical men of Buffalo should look with longing eyes at this gigantic force, going to waste, as they think, so near them; while the extraordinary advances made of late years in the art of transmitting power, particularly that derived from falling water, render it more likely now than ever before that their wishes may be in some degree gratified. If we had the spending of the hundred-thousand-dollar fund, knowing, unfortunately, the bad reputation of American competitions, we should send first to Paris for M. Marcel Deprèz, who probably knows more about the electrical transmission to a distance of the force of falling water than any other person living, and pay him a part of the money for devising a scheme, keeping the rest to help pay for carrying it out. Scores, we might almost say hundreds, of waterfalls abroad are utilized by means of electricity for supplying light, so that the art of entrapping the force is already well understood by many engineers; but the most important experiments in the way of transmitting the power as power have all, so far as we know, been made either by M. Deprèz or by using devices acknowledged to be of his invention, and they have proved very successful. In Southeastern France a cataract, harnessed by his skill, has for some years driven machinery in a town ten or twelve miles away, with a surprisingly small loss of force; and a similar scheme, on a very large scale, is now being carried out in Spain. While we are by no means averse to competitions as a means of stimulating professional skill, where the judgment can be made by experts perfectly familiar with the subject, the case seems to us different with essays in a comparatively unknown field. The unsatisfactory results which have attended the attempts to obtain suitable electric-motors for the elevated railways in New York show how difficult it is to judge the merits of such devices by any other method than that of long use; and it seems to us that in a competition for mere suggestions, such as that at Buffalo must be, the prize would be quite as likely to fall to a plausible enthusiast, whose claims for his own invention no one could, of their own knowledge, dispute, as to a man of real skill, whose greater experience would have taught him how great a deduction for contingencies must be made in estimating results of this kind, while his more sensitive conscience would not allow him to make promises which he could not be sure of fulfiling.

BUILDING ACCIDENTS.[1]—III.

THERE have been a great many disasters to buildings in New York which have occurred within my knowledge, and I herein propose to give a brief account of some of them, and point out how, in my opinion, they might have been prevented.

Many years ago a row of buildings, which were in process of erection, fell. I do not remember how many persons were injured. The loss of property, however, was very great, as the beams, window-panes, lintels, and sills were very much broken. The cause of the fall of these buildings was not at all difficult to trace.

1. The mortar was made chiefly of loam, the bricks were laid dry, so that there was no adhesion of the mortar to the brick.

2. No care was taken to brace the walls of each story during the process of building.

3. The beams were roughly handled as they were taken into the building preparatory to their being lifted to their place in the upper tiers.

4. Their weight, they being piled on the second tier, pressed down the beams which were set, drew the walls of the story above inward. This proceeded in like manner to adjoining houses as the work progressed. When the buildings were nearly topped-out, the walls, being unbraced, could no longer stand the rough usage they were subjected to, and fell.

Had the mortar been made of clean sand and the bricks sufficiently wetted just before being laid, the walls would have been very strong; then the walls should have been well braced, in each story, and the braces should have been well secured to beams that were well supported from below, the braces to remain until the roofs were on. If all these matters had been attended to the building could not have fallen.

A large number of buildings have fallen during the process of erection from similar causes, within my recollection, but in no case were they being built by their *bona-fide* builders, but by speculators who build to sell, and study in every way to build cheaply.

CASE NUMBER 2.

I now propose to state one case of a great number in which the fall of the walls resulted chiefly from a cause different from the foregoing.

Three buildings on one street, and four on another were commenced about the middle of December. The foundation, or cellar-walls were built of very ill-shaped stone. No pains were taken to hammer or tool them to proper beds, and the mortar was of inferior quality. Owing to the shape of the stone, a large quantity of mortar was used to fill the cavities.

Just as the cellar walls were built the weather became very cold, and the walls were frozen solid.

Whenever the weather moderated sufficiently, even for a few hours, the brick walls were laid upon the frozen foundation-walls, which now, being shaded by the floor-beams, remained frozen. By-and-by the roofs were put on, and the brown-stone fronts set, and all frozen.

In a few days a thaw set in, which first caused the brick walls to buckle, by thawing on one side more than the other. Then a warm rain came on; the frozen cellar walls thawed, and the buildings fell. Happily, no one was injured, as the building fell very early in the morning, before men went to work.

I visited the ruins and was astonished at the recklessness on the part of the owners in using such materials. What little bed the stone had was lost by the expansion in freezing of the great mass of mortar.

CASE NUMBER 3.

This was the case of the settlement of a portion of the flank wall of a house, and occurred about twenty years ago. The building was used as a hotel, and patronized by the élite of the city, as well as by distinguished persons from abroad, and stands on the corner of a street and avenue; it faces the avenue and runs down the street about two hundred feet. The side of the building parallel with the street, and facing the yards, and for the space of twenty feet in width and for about fifty feet high, settled about three inches. All the other parts of said wall, each side and above, remained intact. This settlement was a great disfigurement as, independent of cracks, it caused the floors of several stories to tilt towards this outer wall.

It was suggested by several persons that the settlement was caused by a stream of water that had found its way under that part of the foundation, and carried away the earth. The owner of the building called upon me to investigate the matter, and, when I had found the true cause, to repair all damages.

From my knowledge of the ground, before the building was erected, I was well satisfied that no water had found its way under the foundation-walls.

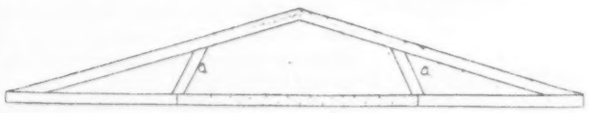
The tenant had enlarged the capacity of the hotel by taking-in several private dwellings on the avenue, and then found it necessary to increase the cooking arrangements. He employed a person to set an additional range just where the wall afterwards settled; also, to make a doorway to an area. In so doing the range-setter had cut away so much of the lower part of the wall, just above the foundation-stone, that what remained was insufficient to sustain the weight above; consequently, the lower three courses of brick were crushed to powder. Had not the beams of each story been anchored to the wall the latter, no doubt, would have fallen outward. The true cause of the settlement being ascertained, the wall was screwed up to its proper position and underpinned, so as to have sufficient area of wall below to sustain the weight above with safety.

The employment of a competent person in the first instance would have saved considerable expense. "Prevention is better than cure."

CASE NUMBER 4.

About ten years ago a two-story building, about thirty feet deep and one hundred and fifty feet front, was erected, the rear part of which abutted against another building.

The trusses of the roof were placed twelve feet apart and anchored to the outer wall, which was twelve inches thick in second story, and made as follows: The tie-beam was made of two pieces of $3'' \times 7''$ timber, in two lengths, and a piece of



same-sized stuff spiked to the side to hold them together. The pieces *a a* were plank spiked to rafter and tie-beam. The weight of the roof with ceiling attached and the snow were sufficient to gradually force the two pieces of the tie-beam apart lengthwise; also to separate them from the piece that was spiked to them, drawing and bending the spikes.

Owing to the building abutting against another at the rear, all the movement was towards the street, until it culminated in throwing the greater portion of the front wall down, as the roof fell in, killing several persons who had just left the building.

The engineer who had charge of the property told me, after the accident, that he was very busy at the time, and left the matter to the carpenters. We see the result.

The trusses of the new roof, which was afterwards put on, will stand until the materials decay.

Had the trusses been properly constructed, and bolts been used in place of spikes, if of sufficient strength to resist the shearing-strain, with due allowance for safety, the lives of worthy people would not have been lost.

CASE NUMBER 5.

This was a case where a building was put to a use quite different from that contemplated by the owner who built it. It was built for an express company and used by them for some years, and afterwards used for the wholesale grocery business.

There was a line of brick piers $2'\ 8'' \times 2'\ 8''$ about twelve feet from centres in cellar, with the usual bond-stone, and a granite cap-stone on top, ten inches thick. On this rested iron columns eight inches in diameter, set on iron plates twelve inches square and one inch thick. The columns supported brick arches and the floors above. The great weight of goods stored on the several floors had split many of the brick piers, and the bond and cap stones, and some of the brick arches near the tops of columns were also displaced.

[1] Continued from page 36, Number 604.

The sudden settlement of a portion of the floors alarmed the occupants, and at once measures were taken to prevent further movement. It was found that in some places the goods were piled up from floor to ceiling in the lower stories, and that the settlement jammed them in, and thus, no doubt, saved the building.

The piers and arches were repaired, and the occupants notified how much weight might, with safety, be placed on each square foot of floor surface.

The tenants said they had been informed that they could load all the floors to the extent of four hundred and fifty pounds per square foot; this was one hundred and fifty pounds more than authorized by the New York building-law, and no doubt the floors were loaded many times more than that.

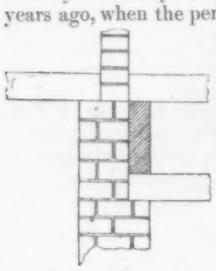
It is certain that the cap-stones of the piers under the iron columns were not thick enough, nor the iron plate under columns large enough or thick enough to transmit the weight from the column to the full size of the brick pier. Had they been so the pier would not have split, notwithstanding they were so greatly overloaded.

CASE NUMBER 6.

An accident by which ten persons lost their lives.

About sixty years ago four buildings were erected on the southeast corner of Grand Street and Laurens Street, now called South Fifth Avenue, built by a man I knew well. They were two stories high, with a pitch roof, a style of building quite common in those days. The first floor was about three feet above the sidewalk. The cellar walls were of stone twenty inches thick, all other walls eight inches thick, of brick.

They had always been occupied as dwellings until about eight years ago, when the person who owned the corner house desired to lower the beams of the first floor of his house to the level of the sidewalk, and fit up a gorgeous drinking-saloon. He applied to the then Building Department, who permitted him to cut away one side of the stone cellar walls, to allow the beams to be lowered as shown in the sketch.



The shaded part shows the part that was cut away, the cutting away of which destroyed the integrity of the wall by breaking the bond and loosening the stones.

In a short time after this was done, and the saloon fitted up in mahogany, hiding the wall completely, the vibration caused by the loaded wagons running on the pavement in the street caused the party-wall to settle down, and carried all the walls of two houses with it, causing the loss of life above stated.

The mistake, no, *the crime*, was in cutting the stone wall.

The proper way, in my opinion, would have been to have shored up the party-wall and the floor-beams of both sides, then to have taken down the wall to the point to which the beams were to be lowered, and after they were in position, to have built up new brickwork to support the beams of the adjoining house and the party-wall, or to have sawed off the beams and built up an eight-inch brick lining alongside the old wall to support them.

CASE NUMBER 7.

Some years ago a change was made in the flour mills of Jones & Company, in New York. In making the change it became necessary to remove a large chimney and to build a new one in a different location. This chimney was about one hundred and ten feet high, and, from long use, the mortar, on being removed, crumbled to sand and powder.

The persons having charge of the work set men to work at the top of the chimney to remove the bricks and mortar and throw them inside the chimney. They had removed but a small portion of the top when the accumulated débris on the inside pressed out the bottom part of the chimney and the whole fell, killing two men.

This accident might easily have been avoided by enlarging the flue opening which entered the chimney near the bottom, and placing across the inside of the chimney planks at an inclination of about forty-five degrees, which would have thrown out the bricks and mortar as fast as it was thrown in at the top, and men could have removed it as it came out, leaving the hole clear.

Wm. P. Esterbrook.

[To be continued.]

ANCIENT AND MODERN LIGHT-HOUSES.[1]—XIV.

HALFWAY ROCK, ME.

THIS light-house, located on a barren rock, so swept by the sea that there is absolutely no soil, contains the dwelling and living-rooms of the keepers, and forms their rather desolate residence. From a distance the gray granite tower, showing a third-order light eighty feet above the sea, appears to stand in the water. The rock is so storm-swept that landings are almost impossible except in pleasant weather: a boat-house was built here of concrete, but the ways where first placed were destroyed by storms, so their location had to be changed, necessitating the cutting of the boat-house in two.

The light-house was built in 1871.

BOON ISLAND, ME.

Like the preceding, this light-house also seems to spring from the waves; the granite tower is one hundred and twenty-three feet high, its base being ten feet above the sea level; alongside is the granite dwelling for the keepers. It was built in 1812 and shows a second-order light visible for eighteen miles.

Before the improvement in the lenticular apparatus had reached its present perfection, by which the characteristics of adjacent lights can be made so dissimilar that there can be no danger of confounding them, the same object was secured by building two, or even three lights close together on the point to be marked. Some relics of this expensive, and, I trust, obsolescent custom still remain. Notably, at Cape Elizabeth, Casco Bay, Me., at Thatcher's Island, Mass., and at Nauset Beach, Cape Cod, Mass. At Cape Elizabeth the two towers were built in 1828, and show the one a white light and the other a white light varied by a white flash every minute at a height of one hundred and forty- three feet above the sea level; both lights are of the second order, and can be seen for eighteen miles.

The Cape Ann towers, on Thatcher's Island, are handsome granite structures one hundred and sixty-five and a-half feet above the sea, carrying first-order lights, visible for nineteen miles. They were first established in 1790 and rebuilt in 1861. At Nauset Beach there are three little, low towers, eighteen feet high, but situated on a bluff, so that the fourth-order lights they carry are ninety-three feet above sea level and can be seen over fifteen miles. There are double lights also on Gurnet Point, near Plymouth, Mass., and on Baker's Island, Mass., but these are of use mainly as "ranges."

BOSTON LIGHT.

The oldest light-house in the United States is the Boston Light, situated on Little Brewster Island on the north side of the main entrance to Boston Harbor, Mass. It was established in 1716 and rebuilt in 1859. The light is of the second order, flashing every thirty seconds, is shown from a tower one hundred and eleven feet above sea-level, and is visible for sixteen and one-half miles. The following account of this light, and of some of its various vicissitudes is taken from the *Boston Evening Transcript* of August 26, 1880.

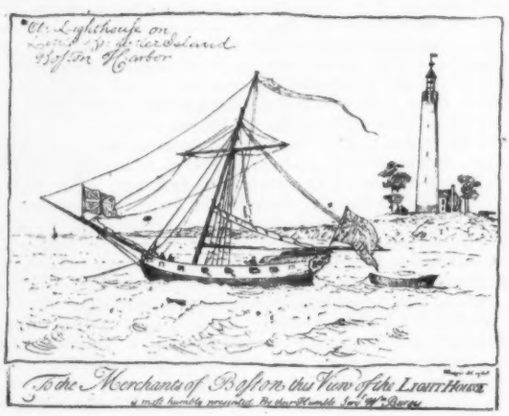
In the *Evening Transcript*, copied from the *Providence Journal*, the latter paper is mistaken in saying that the light-house built in 1740 on Beaver Tail, the south end of Conanicut, was the oldest light-house built on the New England coast, or even on the American coast; the second being the Brant light, entrance of Nantucket Harbor, in 1754, etc.

[1] Continued from page 16, No. 602.

Our Massachusetts records, and also those of Nantasket (Hull), give evidence of one built by the Massachusetts Colony thirty-four years previous to 1749, viz.: "The General Court of the Province [of Mass. Bay], order a Light house erected by the Province, June 9, 1715, & a committee named to build it, viz: William Payne, Colo. Samuel Thaxter, Colo. Adam Winthrop, the Hon. William Tailer, & Addington Davenport added to it. Approved by Gov'r Dudley — enacted in July, & 1*d* a ton inward & 1*d* a ton outward to be paid to the Receiver of Imposts by all ships or vessels except coasters: & an application made to Hull for little Brewster for it, £60 allowed Payne and Capt. Zac Tuthill to build and finish it. Lt Governor Tailer assented." The cost was £2,385 17*s*. 8½*d*.

Hull generously assented as "at a legal meeting of the Proprietors of the undivided lands in Hull, on Monday, Augt 1, 1715 Colo. Samuel Thaxter for the com'e on application for building a light house on Brewster Island, so called, adjoining to the Great Brewster, being present and 'censeble' of the general benefit to trade and particularly to themselves, by unanimous vote have granted the said Brewster Island in the Province of Mass Bay for the use of a Light house forever: provided said proprietors of the Great Brewster be held harmless. Hull Augt 1 1715."

"1716. A com'e of Hull petitioned the Genl Court for liberty to choose a Light House Keeper." But "June 25, 1716 the General Court appointed a committee to choose one, at £50 a year, & chose



George Worthylake, husbandman, Æ. 43, as the 1st keeper." In the second year, on his petition, his salary was raised to £70 as "he lost 59 sheep by drowning in a severe storm, his attendance on the Light House preventing him from saving them."

He and wife and daughter Lucy, or Ruth, were drowned November 3, 1718 going to Noddle's Island, and were buried in Copp's Hill cemetery, Boston.

Benjamin Franklin issued a ballad on the occasion and hawked it about Boston. November 18, 1718, John Haynes was chosen the second keeper of the light; he was a mariner and pilot, and resigned August 23, 1733, and was succeeded by Capt. Robert Ball, an Englishman, on August, 1733. He married Mrs. Martha King, of Charlestown, whose daughter Martha married Adam Knox. In 1776 the town of Hull dissented from Robert Ball's proposals, paying him "£5 for 4 years past & same anualy, as long as he keeps the Light House." By this, Hull had some interest in the keeper, or, perhaps, employed his services for the beacon or watch-house. Ball was taxed in Hull, 1767, but he refused, as non-resident; it was finally abated in 1774. His son, Capt. Robert Ball, sea captain, wills, in 1772 or 1782, Calf Island, Boston Harbor, and Green Island in Hull to his son John, and to his daughter Sarah, the outer Brewster Island (which was sold in 1794 for £50).

Robert Ball Sr. kept the light-house from 1733, under the Royal Government, to or after 1766, and one account thinks till after the British fleet left Boston Harbor in the Revolution.

June 19, 1746, John Fayerweather, a merchant of Boston, in his account-books on that date charges the "Town of Boston 50*s*., cash paid at ye Light House *Tavern*, for sundry meetings held there with ye committee to measure ye rocks from ye lower middle ground, for order to sink hulks, if occasion, & 8*s* 6*d* more for drink, for the boats crew in April — total £3–4*s*–8*d*." And gave an order to Henry King to receive it. He credits "received of King £2–19–8."

1751. The light-house injured by fire was repaired.

1775. The light-house in possession of the British fleet, was destroyed July 19 by the Americans; Admiral Graves of the British fleet repaired it.

July 31, 1775 the Americans again destroyed it; it was again repaired, and when the British fleet were driven from Boston Harbor Captain Bangs, of the "*Renown*," placed a train of powder under it and blew it up.

A keeper who was at the light-house with his wife when destroyed by the Americans, left his property and fled to Dorchester; there his wife saw one of her dresses on a woman in the street.

1783. Massachusetts rebuilt it, sixty-eight feet high, of stone, with four lamps of a gallon of oil each, and four burners, and on November 28th of that year, Capt. Thomas Knox, pilot, was appointed keeper by Governor Hancock. His father, Adam, and mother, Martha Knox, resided there with him; she died there January, 1790, and Adam died there December of the same year, aged eighty-one.

1790. The island was ceded to the United States. In 1829, Johathan Bruce, pilot, was keeper, being recommended by the Boston Marine Society.

Neal, in 1719, says: "The light house was built on a rock above water, 2 leagues from Boston, where, in time of war, a signal is made to the castle & by the castle to the town, by hoisting and lowering the Union flag so many times as there are ships approaching; if they exceed a certain number, the castle fires 3 guns to warn the town of Boston, & the Gov'r if needs be, orders the Beacon fires, which alarms the adjacent country, and gives 6 or more hours to prepare for their reception." "*Shaw's History of Boston*" (Pemberton's account), 1817, says: "Light House Island is a high rock of 2 or 3 acres, ¾ of an acre of it good soil; a bar, dry at low water, connected with Great Brewster; a stone Lt house shows one light; it is 8¼ miles from Long Wharf, Boston, and was formerly known as *Beacon* Island, &c.; pilots here have a piece of artillery to answer signal guns."

This and all the islands and Nantasket, including its beaches, were, on the settlement of the colony, covered with dense woods.

In 1676–77, the proprietors of Hull divided the wood on the lesser Brewster, as they afterwards did on the other Brewsters, to clear them for planting and grass, to be done by May 1, 1679, the land and lots to be divided by lot.

"Due me, Nat bosworth and gorg Vickare (of Hull) for going to bruister's islands, ...	2s. 6d.
For meeting the indians that cut the wood, pint wine . .	1s. 6d.
For going to tack the measure of the wood which I found corded, good and large measure; 240 cords and 2 large heaps, was carried to water side; that the indians abeached was 30 cords more, so that the whole some was 270 cords, ...	2s. 6d."

1801. Sumner's "*East Boston*" speaks of the Brewsters wearing away.

1815. Boston Marine Society petitioned to have the light-house lit in winter (probably closed in war of 1812).

1860. The old tower was heightened and had a revolving-light. There was, no doubt, quite early a beacon and watch-house erected on Beacon or Light-House Island, as well as on Point Allerton Hill, by the town of Nantasket (Hull) to look out for and warn of an enemy's approach.

On the Massachusetts archives is this: "Hull, March 9, 1673–4. A true copy of the charges of the town of Hull hath been at about the Beacon, with the persons that *warded* the said Beacon, with an account of corne that was spoyled by carting over the said corne, and what was pluct up to set up the Beacon. The ward was, first, Benj. Bosworth, Sen'r, 17 days [other names omitted here] total 66 days. In the name of the Towne Serg't Bosworth, Nathaniel Bosworth.

"Charges about the Watch-house — timber & setting up, 2s., 300 of boards, 10s. 6d.; nails, 2s.; carting to the place, 2s. is £0 16s. 6d.; more for the beacon: a kettle, 5s.; for pitch, 2s.; John Loring & John Prince for making fier bales with pitch and ocum to make the bales, 1s. 6d.; for men to go to Boston to fetch more pitch for the beacon, 4s.; sum, £0 16s 6d.; total, £1 13s. 0d. For the corne spoyled by carting of the beacon setting up, which corne Capt. Oliver had a note of, to show to authority, which was three bushels."

March 9, 1673–74. The petition of the inhabitants of Hull about the trouble of setting and warding the beacon *erected on Point Allerton*, says: "We are a small people, our employment is wholly at sea, constantly every week of summer time, so that the whole burden lay upon a few men, whereby those men not only lost their time, but by continued working and warding, made unfit to carry on our employ, which we think is not the case with any other town in the colony. You do not consider how hardly it pinched us; yet we are assessed to pay our whole rate to the county & the castle. We think it too

hard, &c. Notwithstanding that at the request of the Hon'd persons betrusted with the castle edifice, who send to us to dig and have some stone quarried at Brewsters Islands, which we consented to, & gave a gratuity thereto to the number of 400 boat loads, we hear that other towns had abatement in those rates, but we have none, but the castle got our stones and we may pay for the boating of them. We request the Hon'd court to weigh well these premises, and doubt not that they will do right, and have sent this 2nd address, and we, committing you unto the Lord's direction, we take leave to rest yours, in all humble subscription, Nath'l Bosworth, Thos. Collyer, John Benson, Sen'r, John Loring, Robert Goold, Selectmen, and in the name of the rest, Hull, March 9, 1673–74."

Indorsed "The magistrates remit the town of Hull the county rate, their brethren, the Deputies, consenting, Edward Rawson."

"The Deputies consent *not* hereto, but judge meet to refer ye answer to the said petition to the next Court. The Hon'd Magistrates consenting hereto, Wm. Terry Oliver, 27-3-1674, consented to go to ye Magistrates, Edw. Rawson, 29 May, 1674."

Hull's county tax for 1674 was £8 4s. The beacons on Point Allerton and Beacon Island were, no doubt, the origin of the lighthouse on the latter.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF ALEXANDER MOSLEY, ESQ., COMMONWEALTH AVENUE, BOSTON, MASS. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued only with the Imperial Edition.]

HOUSE FOR MRS. C. A. PLIMPTON, WALNUT HILLS, O. MESSRS. BUDDEMEYER, PLYMPTON & TROWBRIDGE, ARCHITECTS, CINCINNATI, O.

THIS house is situated upon a picturesque side hill among the trees in Walnut Hills, and was completed about three months ago at a cost of $10,000. The basement and first-story walls are of stone, rubble-work, and the second story of half-timber, with brick filling, the wood used being Mississippi cypress throughout; the interior finish being of the same wood with exception of hall staircase, which is of oak. The floors are of Southern hard pine and natural joists show in the ceilings, the plastering being done in between. The first and second stories, sides of dormers and chimneys are finished in cement, the last coat being "broomed on" and honeycombed with Ladd's Georgia white lime. The roof is of red shingle tile with terra-cotta ridge and hip moulds. All metal-work of heavy copper.

SKETCHES AT BELLE-ISLE PARK, DETROIT, MICH. MESSRS. DONALDSON & MEIER, ARCHITECTS, DETROIT, MICH.

THE Casino was begun in August, 1886, and completed in June, 1887, and is now in use as a resting-place and restaurant, etc.; it is finished throughout the interior in wood. Some suggestions of the interior are shown. The pumping-station and engine-room for water-supply and electric-lighting is of brick and stone. The pavilion contains dry-earth closets and urinals. The wharf-covering is of wood; all the last mentioned, *i. e.*, engine-house, pavilion and wharf-covering are in process of construction. In addition to the above work are a number of rustic bridges, boat-houses (one of which is shown), etc.

Plans for the general improvements on the park (which contains about seven hundred acres) including road and water-ways, lakes, bridges, etc., were adopted in January, 1887, and a considerable amount of this work has been done, as well as the buildings shown.

U. S. COURT-HOUSE AND POST-OFFICE, SAN ANTONIO, TEXAS. MR. M. E. BELL, SUPERVISING ARCHITECT.

CHURCH OF ST. JOUIN, MARNES, FRANCE.

DETAIL FROM THE CHATEAU DE BLOIS, FRANCE.

THE NEW BERLIN BUILDING LAW. — A revised law governing the erection of buildings has just been adopted by the municipal authorities of the capital of Germany. No new building shall cover more than two-thirds of the area of the building lot, and in the case of buildings erected in place of torn-down structures, on lots previously built upon, the area covered by the building shall not exceed three-fourths of the whole lot. The maximum height of any building is limited to seventy feet. All buildings must, moreover, conform to the law requiring the height of the street front, measured from the sidewalk to the main roof cornice, not to exceed the width of the street. Blocks of houses are permitted, but in the case of detached buildings the distance between two adjoining ones shall be at least eight feet, if there are no windows in the side walls, and at least twenty feet in the case the side walls have windows. These requirements are, obviously, intended to secure to the dwellings ample light and air, as well as sunlight for all living and sleeping rooms. — *Iron.*

THE IMPERIAL INSTITUTE.

MAISON DE LA RUE DU JOUR — Chef de Voûte

After La Construction Moderne

THE foundation-stone of this proposed new building was laid by Her Majesty the Queen, with great ceremony, on the 4th of July, and so the matter remains for the present.

As our readers are aware, the design of Mr. T. E. Collcutt, of Lancaster Place, Strand, has been selected for execution, and he has been formally appointed architect for the work. We feel quite sure it could not be intrusted to better or more artistic hands, but whether his design "after modification" will represent the Imperial idea one expects to see embodied in the architecture of this great public building is quite another matter. Mr. Collcutt's design is the result of a select competition limited to six architects — four representing England, or rather London, one Scotland, and another Ireland. The competition had, therefore, something of an international character about it which lent additional interest to the result. After the award was made the designs were on view to the public for about a week, and we propose to make a few remarks on this, the latest important competition of the day. As to the policy of limiting a competition of this national character to *six* architects only, or to the wisdom displayed in the choice of the six representative men, we do not propose to refer. What we have to do with is the result and its influence on the architecture of the day. The architects chosen to compete were Messrs. A. W. Blomfield, T. E. Collcutt, T. G. Jackson and Aston Webb & Bell, of London, Dr. Rowand Anderson, of Edinburgh, and Messrs. T. N. Deane & Sons, of Dublin. Their task was, in the first place, to design a public building wherein the Imperial greatness of the British Empire would find some fitting architectural expression; and in the second, to provide halls for meetings for Imperial purposes, exhibition-galleries for the display of Indian, Colonial, and home products, a series of offices for the Colonial Institute, the Asiatic Society, Emigration Society, etc., together with a library and other adjuncts. It is a great opportunity for the display of genius, the more so that there is little or no precedent for such a building. The instructions were necessarily vague on many points, as, apart from giving a general idea of the accommodation required, there was nothing to indicate how or in what manner it should be provided, or the relation of one department to another. All this was left to the skill of the designers, and as a consequence, where there was so little common ground to start with, the results are widely different.

The site is on part of the grounds of the horticultural gardens at South Kensington, fronting on a new street proposed to be made behind the Natural History Museum, from Exhibition Road to Queen's Road — almost on the site of the great Central Avenue of late annual exhibitions — so that the front will be parallel to and facing the rear of the Natural History Museum. Into the wisdom of this choice of site it is useless now to enter; the point has been debated over and over again; it may make or mar the fortunes of the scheme, the future alone can tell which, and with the future we propose to leave it.

Taking a general glance at the arrangements of the six designs, they will be found to divide themselves into two types of planning — four designs in which the "reception-hall" is made the central feature and placed at right angles to the main front, and two in which this hall is placed to one side and parallel to the front. The first is undoubtedly the true one, and accordingly we find it so arranged in Mr. Collcutt's plan. All the halls are more or less of a basilican type, with a semi-circular apse at one end — and most of them with aisles. The offices of the various departments are generally arranged along the main front, and the exhibition-galleries around one or two courts. Three of the plans, viz., those by Mr. Collcutt, Mr. Blomfield, and Messrs. Webb & Bell are remarkably similar; and their arrangement is probably the best for purely exhibition purposes, as they not only provide the best galleries for the present, but also for future extension — one indeed, Messrs. Webb & Bell's, seems to be all galleries together, in fact, a vast museum.

Mr. Jackson's plan suggests a gigantic college. Dr. Anderson's much the same, only on a smaller scale — while Messrs. Deane & Sons' stands by itself, and is laid out with great architectural effect — a palace for Imperial purposes. Its chief defect is that the reception-hall is relegated to a subordinate position to one side — balanced by the conference-hall. Had the library taken the place of the former and the reception hall been placed in a central position, as in the selected design, Messrs. Deane's plan would have fulfilled the idea of an Imperial public building more fully than any of the others. Instead of this, however, its talented authors have let architectural grandeur run away with them to the extent of providing a vast useless "amphitheatre" as their "future extension," in which the exhibition-galleries are more or less sacrificed to purely architectural display. It is very magnificent, but it is not business. On the other hand, the "future extension" of the selected design savors too much of the "Brompton Boiler" idea, as if to provide great exhibition-galleries was the main object of building — and architectural

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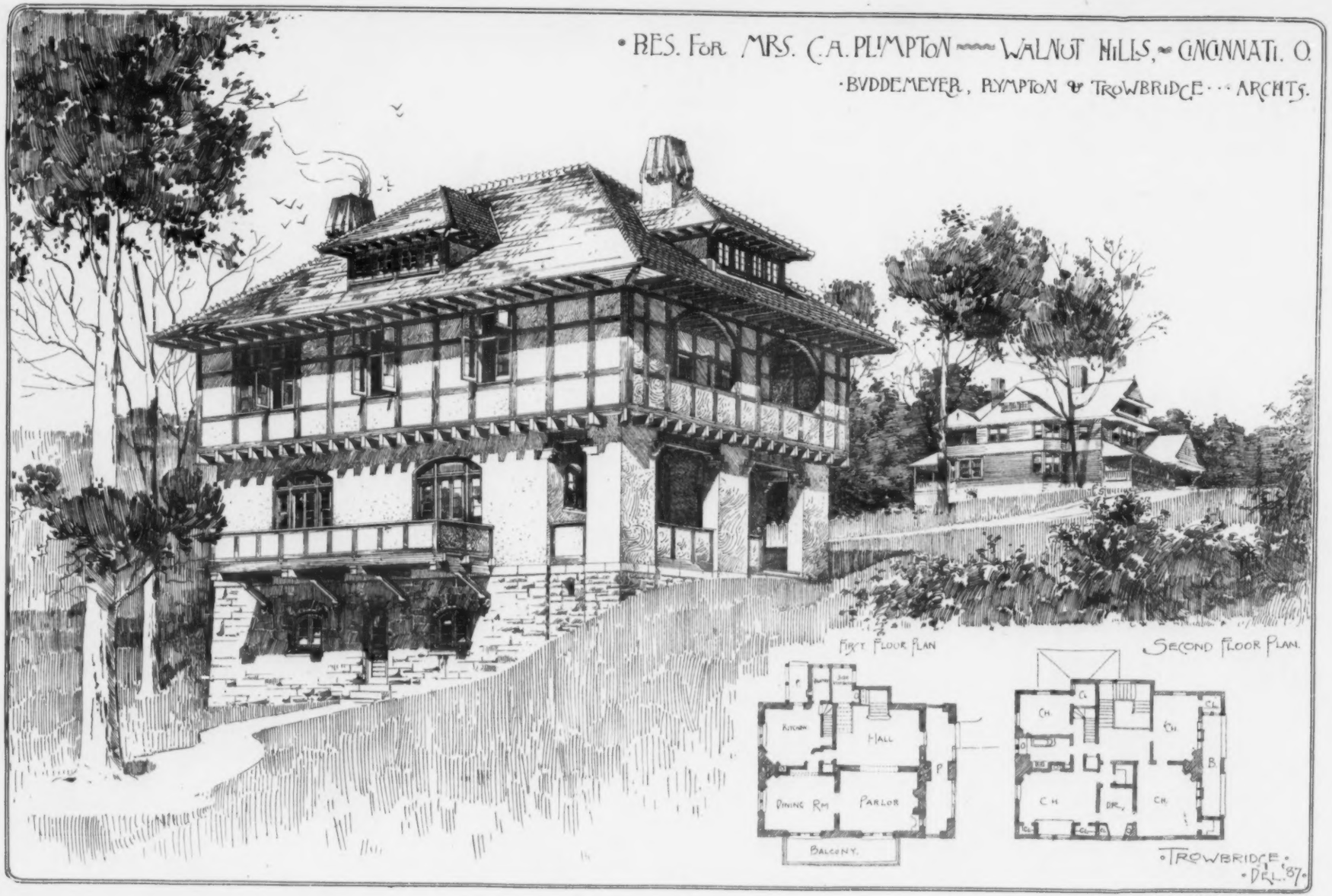

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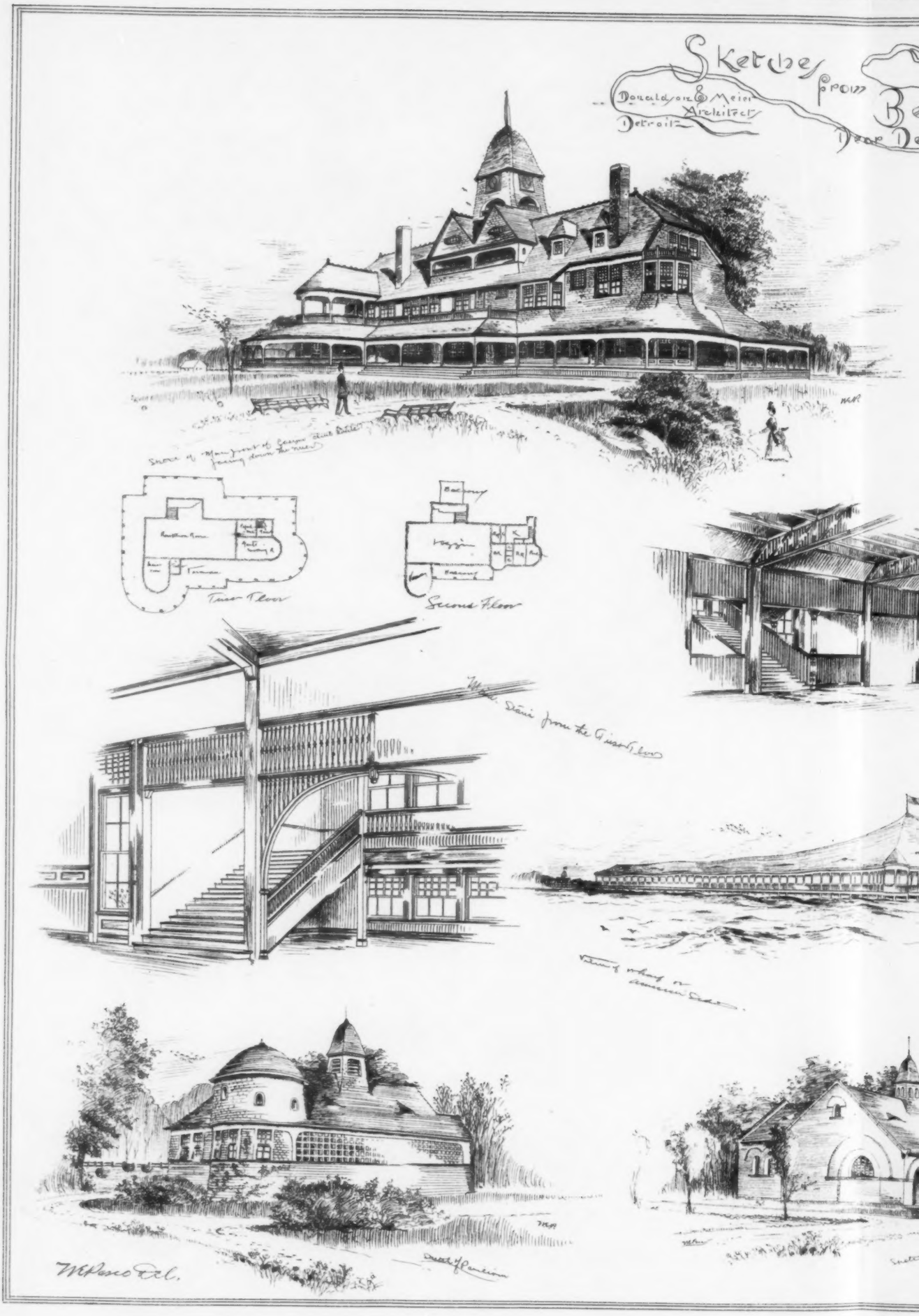

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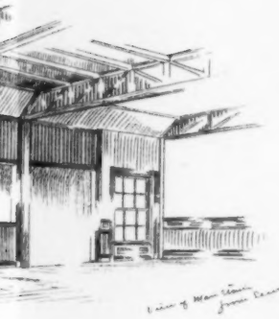
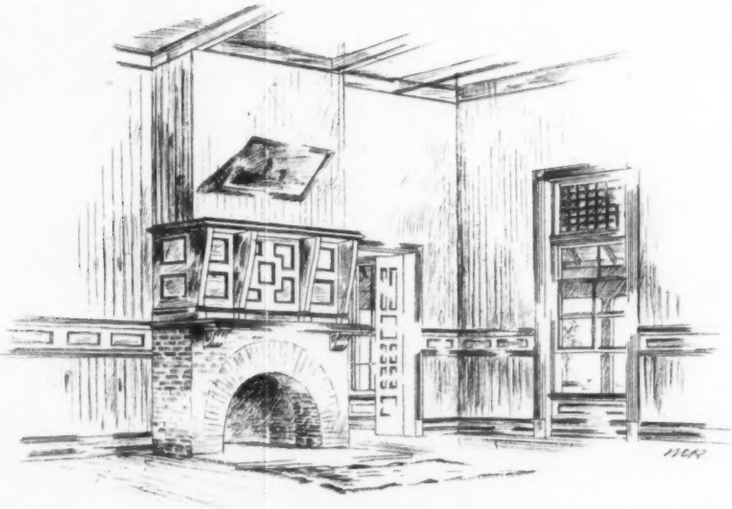
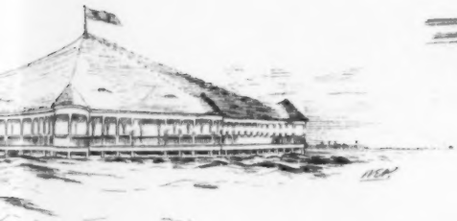
Belle Isle Park
near Detroit
Mich.







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SAN ANTONIO, TEX.

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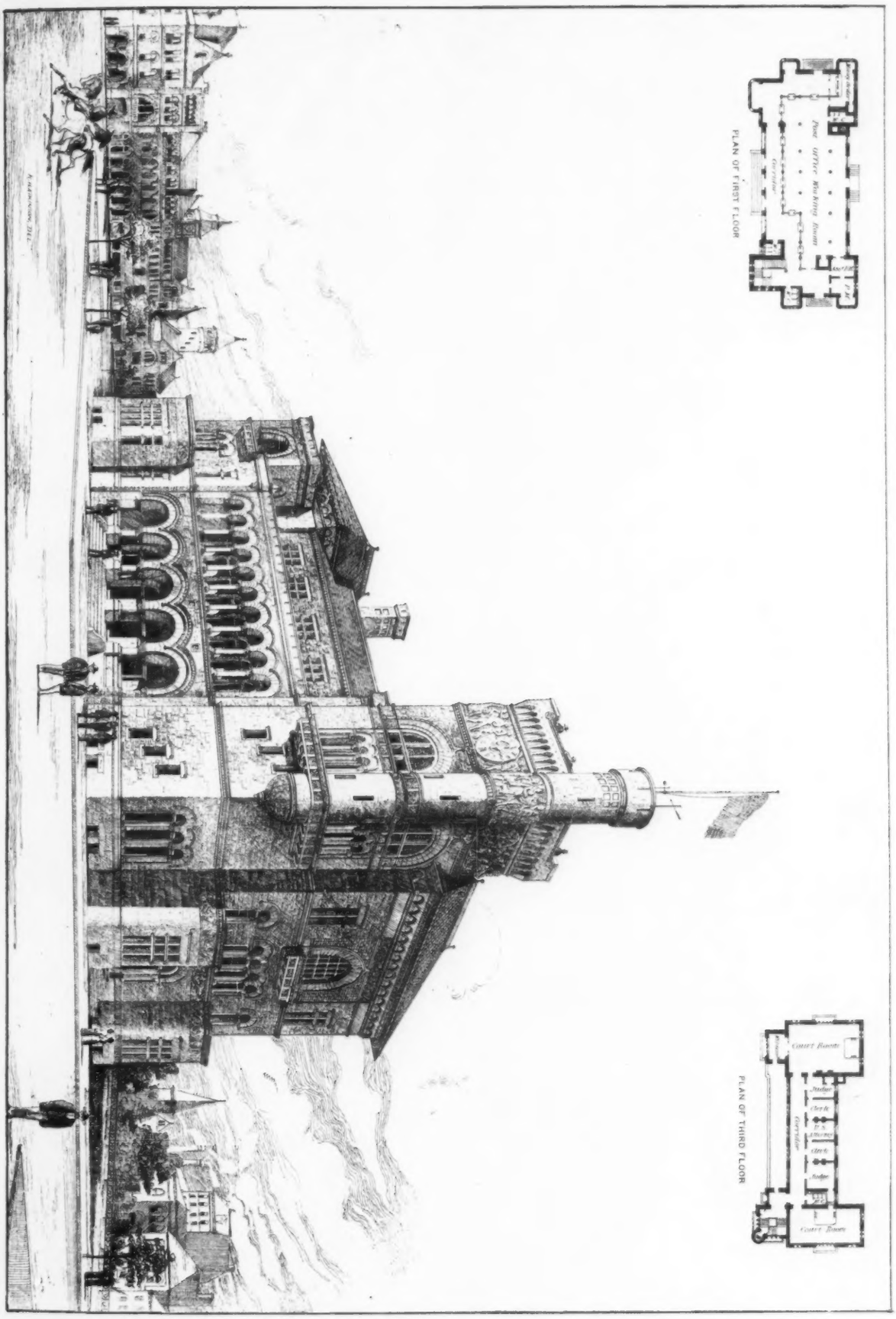

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SAN ANTONIO, TEX.

M. E. BELL,
Supervising Architect

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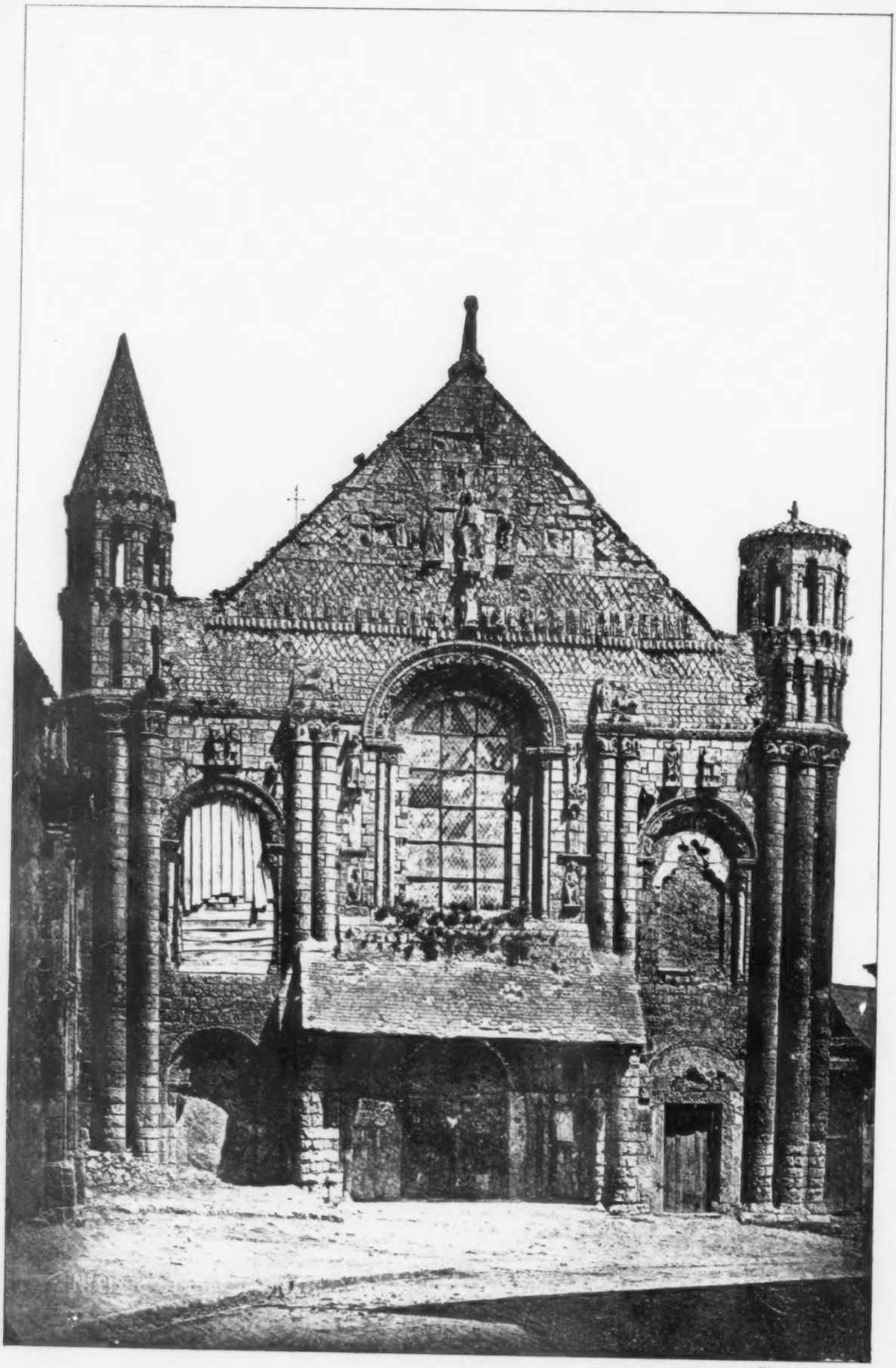

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Church of St. Jouin, Marnes, France.

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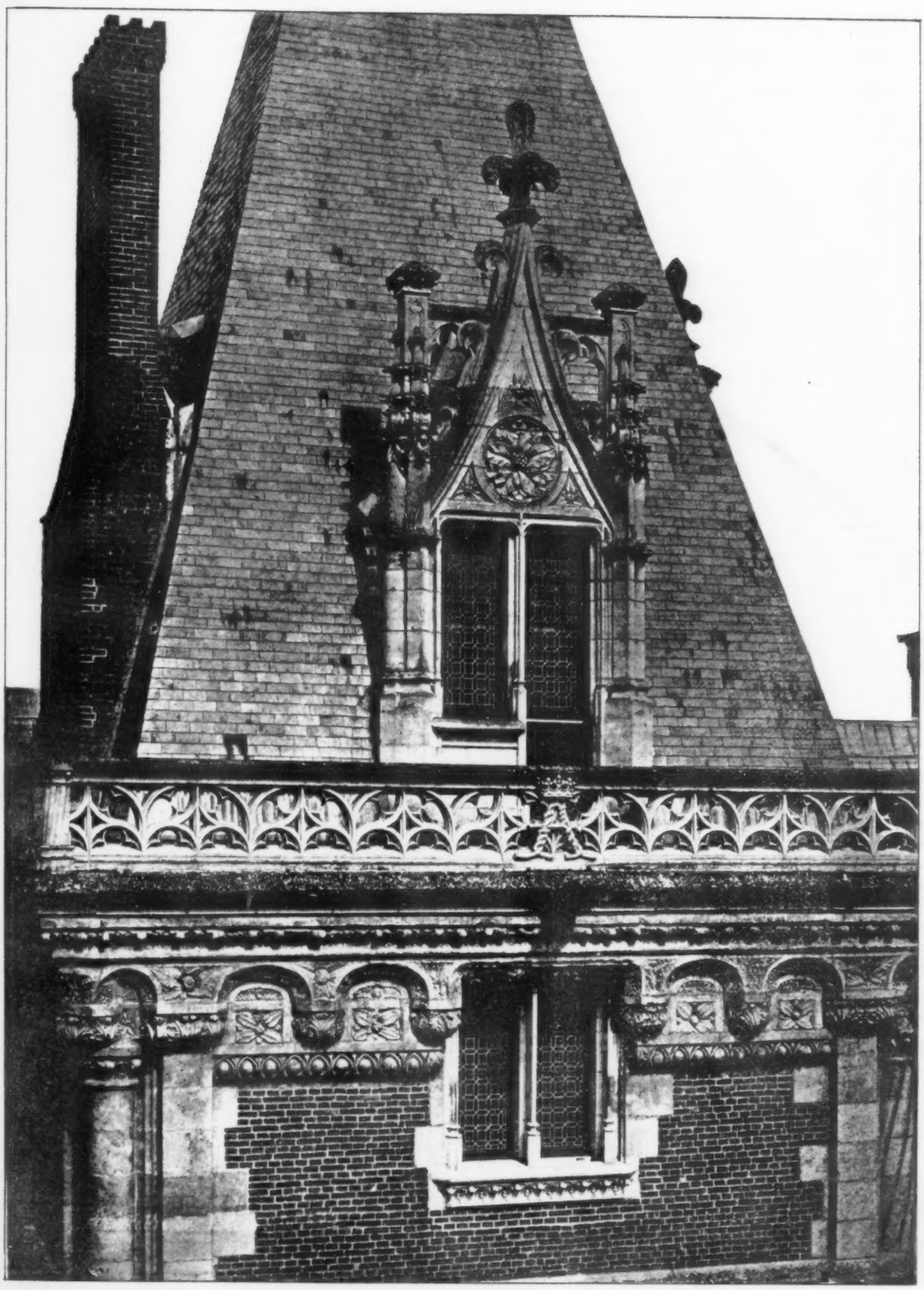

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Chateau de Blois.

display becomes lost in the utilitarian. We apprehend something more monumental than this is wanted. The entrance to Mr. Collcutt's building is mean, compared to the sumptuous portico designed by Mr. Deane, while the central hall under the dome of the latter is in every way more magnificent than the somewhat limited vestibule and *cortile* of the former. Again, in spite of its being evidently designed for architectural effect Mr. Deane's plan is, in some respects, far more compact than Mr. Collcutt's — the library and the conference-room are miles away from each other (so to speak) in the latter — a great defect, we think — while in Mr. Deane's they are within easy reach for reference and consultation. The central block above the entrance in Mr. Collcutt's work is thrown away on nothing more important than refreshment-rooms and kitchens, while the great central portico rising through two stories in Mr. Deane's gives that dignity to the central feature which we expect and look for in such a public building. We have compared these two plans — as we shall presently do their architecture — at some length, as they are two such distinct types. The others that mostly follow on the lines of the selected design are probably not equal to it in general arrangement.

Mr. Jackson's plan is very picturesque, but neither it, nor Dr. Anderson's ever rises to the dignity of the occasion, either of them are more like college or University work; they seem to have missed the great idea.

What now is the result of this great competition from a purely architectural standpoint? With one exception we are struck with the moderation — almost the "smallness" — of the ideas set forth, and the eclectic character of the designs generally. The expected great architectural effort has not been forthcoming. The general effect is that of a number of small features, which might have done very well on a moderate-sized building, — spread out to do duty on a very large one — not only so, though, perhaps, from the nature of the case, the architecture is of the most nondescript character, showing there is no great school of architectural thought amongst us. It is all more or less the passing fashion of a day; the terra-cotta school, or the furniture school, or whatever it may be called, run rampant. There is nothing enduring, nothing distinctive, nothing monumental, nothing Imperial in it at all. People are fond of talking of the greatness of the British Empire and of comparing it with Rome — to the advantage of the former; where, then, is the expression of this greatness? Is it to be found in the prettinesses of these neatly-drawn designs? Fancy a Roman of the Imperial days standing before Mr. Collcutt's building and being told it is the embodiment of the might and majesty of the greatest empire the world has ever seen, would he believe his eyes or his ears? For assuredly he could not reconcile them; either it must be the capitol of a small Low Country state, or England is a very provincial empire after all. The Imperial Institute! There is nothing Imperial here. It is a very pretty, very artistic, very cleverly-designed block of offices, or big hotel, or apartment-house — it could hardly fail to be otherwise considering who its author is — and if this is all that is wanted it could not be in better hands, but of Imperial England at the height of its world-wide power, its unparalleled wealth, its historic glory, it tells not a word. Along its front, we are told, are bas-reliefs in panels, representing historic events. Pooh! they are far too small, they will be simply lost sight of in a building this size. So with all the other pretty little features, they will be nowhere. For all that, it is in many respects beautifully designed, detailed, and, above all, charmingly drawn, but it is all a huge mistake. It has neither the dignity nor the grandeur of a great monumental work. It is not to be mentioned in the same breath with Somerset House, much less with St. Paul's, or, if we go to the Palace of Justice in the capital of little Belgium, we find Great Britain is not even in the running.

Only one of the designs approaches within measurable distance of a great work — that by Messrs. Deane & Sons — and half its dignity is lost by the meaningless repetition of *eight* small domes all alike. Its central dome is but poorly conceived, a weak copy of the great St. Paul's: still the great portico, with its double range of columns and broad flight of steps, is stately; together they form a noble entrance. The quadrant loggias, which join the central block to the wings, are effectively planned, but the columns should have stood clear from the walls behind, so as to get the full benefit of the play of light and shade. On each side the central steps are placed two huge pedestals, with colossal statues thereon. They swamp everything else, and are quite out of scale with the portico behind. Much of the detail is of a meretricious character, not by any means equal to the spirit of the composition as a whole. Still, for all that, and allowing for many faults, this Irish design is worthy of the occasion — it appeals to the Imperial instinct, our friend, the old Roman, would at least be able to understand what it is all about—there is no mistaking it for other than a great national monument. The group of figures in the pediment of the great portico are big enough to tell their own story. Its general features are better proportioned to the size of the building than in any of the others. They would hold their own, they would not be lost in the size of the mass; there would be great play of light and shade over the recessed central block, the quadrants, and the advancing wings, and, another great point in such a site, it would never be taken for a part of the Natural History Museum in front of it as seen from Cromwell Road. Its distinct individuality would claim attention, not to say comparison with the big Museum, and it would not suffer by the contrast. Moreover, it is in a phase of architecture which has endured for centuries, of which there is an English version just as truly as there is English Gothic, and this English type of Classic has been aimed at here. We feel it is no passing fancy in red brick or terra-cotta, no creation of an hour any more than the empire it represents, but that it carries on its face an historic tradition, telling of a past as well as of a present, and in this way is an embodiment of the Imperial idea. Again, it is founded on a type of planning peculiarly English, as witnessed in Blenheim and a dozen other great buildings throughout the country, and in this respect is more national than any of the others. We don't want a Flemish or a Dutch Rath-haus, or a Romanesque palace, but an English public building, and, curiously enough, the Irishmen have given us the nearest approach to it. It is understood, however, that the *cost* of Messrs. Deane's scheme put it quite out of the competition. So much the worse for the competition and for the Imperial Institute. Belgium is said to have spent £3,000,000 sterling on her new Palace of Justice; rich England can only afford a tenth of this for what is destined to become one of the most important of her public monuments!

The design by Dr. Anderson is also in eighteenth-century Classic of a somewhat Adam's type, but it never rises above the commonplace in architecture. Indeed, the Scotchman is altogether out of running, his design is the poorest of the lot; he evidently has failed to grasp the greatness of the opportunity.

The remaining three designs are all of the nondescript type. Messrs. Webb & Bell's is, we presume, "Romanesque." It follows closely in the style of Mr. Waterhouse's Natural History Museum, only richer in detail, so much so, indeed, that if it were built, it would inevitably have been mistaken for a portion of it in the general view of the two from the south. Its principal feature is a great campanile, called "The Queen's Tower" — standing clear of the building in a kind of open square in front of the main entrance; two subordinate towers flanking the central block are so like Mr. Waterhouse's work that they might have been designed by him. It appears intended for execution in terra-cotta, and looks exactly what it is — a vast museum.

Mr. Jackson's work in red brick with stone dressings looks more like a Flemish Rath-haus; it has a great central tower reminding one of the Low Countries. It has a straight front, broken at the angles by octagonal towers, and divided into a series of bays terminated by gables, very much in the style of his recent work at Oxford. An open carriage-porch marks the entrance. It is full of charming detail such as we expect from Mr. Jackson, but that is all. It might be almost any kind of an "Institution" but an "Imperial" one, and we are forced to regret that this clever artist has failed to rise to the occasion. Much of the work both in plan and elevation is exceedingly quaint and picturesque, but we fancy these qualities are not quite all that is wanted in a great public building. The tower dwarfs the whole composition and seems quite out of scale with the rest of the front. There seems, also, a lack of harmony in style between it and the rest of the work, particularly in its upper stages.

The remaining design, Mr. Blomfield's, is of a nondescript Classic type. Its principal feature is a central dome over the entrance-hall, with a two-storied carriage-porch projecting in front. Like Mr. Jackson's tower, this dome is in a different type from the rest of the work, the proportion and detail of its parts being out of scale with the front. Indeed, instead of the grouping of the façade leading up to the dome, it is cut completely in two by it, so that the front extending on each side has the appearance of two separate wings, an impression strengthened by the high pitch of the roofs. The architecture of the central block under the dome is a curious medley. The dome itself is octagonal on plan, the drum very wonderful in proportion and detail, the whole feature having much the appearance of an afterthought, and the front of having been divided to receive it. Why Mr. Blomfield did not give us a design in the Gothic he understands so well, instead of the Classic he does not, is a mystery unless we are to take it as a confession by the most consistent of our Gothicists that the days of the revival — for great civil buildings — are numbered, closed, shall we say, by Mr. Street's Law Courts.

Such is a general review of the several designs; what may ultimately be built is still an open question. As in some other important competitions of late, the award of the judges begins by saying that "they do not find any design which could be adopted without alteration," and having thus thrown cold water as it were on the lot, they select Mr. Collcutt's design, to be carried out with certain "modifications" vaguely hinted at under the words of "the tower and some other points." We hear the tower is generally considered too lofty and out of keeping with the rest of the design, and a dome is suggested in its place, but how far the rest of the design is involved in the "other points" it is impossible to say. Until the amended design is finally approved and published, therefore, the form of the future Imperial Institute must remain in uncertainty. It would be useless to speculate in what direction the "modifications" are likely to tend. It is much safer to leave them with the architect and the committee.

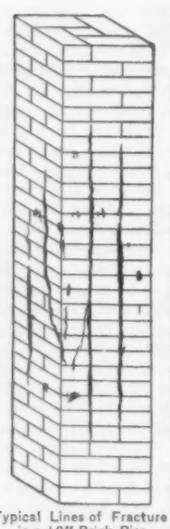
Looked at merely as a display of English architectural design, the competition is somewhat disappointing. It shows in the strongest possible manner the chaos existing in the architectural mind of the country. We may be told that to this is due the strong individuality of English architecture. Possibly so, but a great national architecture is not to be worked out by individual effort, which rushes after everything and anything in the way of style, whether it be the last new fashion in design or materials, or whether it be merely because

the "professional assessor" is well known to have practised in it, and so likely to look kindly thereon as a veiled compliment to his artistic powers. We are afraid some such tendency has been very apparent more than once of late, and we can hardly conceive any course more likely to end in feebleness or retard all progress towards a healthy national style of our own. To imitate new work of any kind simply because it is new or fashionable, instead of fostering a natural development founded on a careful study of the spirit and the letter of the historic work of our own country, seems to us hardly worthy of our position as artists, and little likely to give us great national monuments architecturally or otherwise. From this point of view the Imperial Institute designs are not very encouraging. The six competitors have given us as many different styles or phases of styles, more than one of them paying court to the latest mode. There is no unity of effort, each is like the wavelet of a lake rather than the onward sweep of the ocean tide; they break on the shore with a little fuss, but contribute nothing to the high water of thought and progress. As such, their influence on the architecture of the day can only be evanescent.

The selected design has probably more individuality about it than any of the others except Mr. Jackson's. On this account it is interesting; moreover, it is very picturesque, but it never rises much higher than this, and, being in the fashion of a day, will probably be only a subject of wonderment when the fashion has passed away. We looked for something nobler, something more elevated, something more enduring than this, something that would become not only a landmark and a guiding star in the architectural history of the reign, but a monument of the history of the Empire. The great opportunity seems in danger of being lost.

THE CRUSHING STRENGTH OF BRICK PIERS, — II.

AND THE STRENGTH OF SINGLE BRICKS AND MORTARS USED IN THEIR CONSTRUCTION.



Typical Lines of Fracture in a 12″ Brick Pier.

WHERE there are few tests, or only one of a kind, extended deductions cannot judiciously be made; such differences, however, as were found to exist in the results will be pointed out, and their significance explained within what appears to be reasonable limits.

The tabulated results show the crushing strength of the piers ranges between the limits of 773 and 3,776 pounds per square inch.

The influence of the quality of the mortar on the strength of the piers is well shown in the following table:

Generally, there was a decided difference in strength between short and tall piers, the highest strength being displayed by short piers laid in strong mortar, while the least strength was shown by the tall piers laid in weak mortar. This fact shows one of the reasons why it is desirable to test piers of ordinary heights, and not base our computations on the strength of short piers alone, as by so doing we should over-estimate the strength of the brickwork in most cases.

For example, face-brick pier No. 286, 12″ x 12″ x 2′ high, laid in mortar composed of Portland cement and sand, crushed at 3,670 pounds per square inch, whereas the corresponding pier 10 feet high, crushed at 2,253 pounds per square inch, a difference of 1,417 pounds per square inch, or 188,000 pounds total. With some other piers this difference was exceeded, while on the other hand there was only a slight reduction in strength shown by 12″ pier No. 334 over the short one.

ALL 12″ PIERS 6′ HIGH.

No.	Composition of mortar.	Efficiency of pier.
		Per cent.
288	1 lime, 2 sand,	9.9
289	" "	10.6
301	2 lime-mortar, 1 Rosendale cement,	14.4
293	1 Rosendale cement, 2 sand,	17.3
300	2 lime-mortar, 1 Portland cement,	12.4
294	1 Portland cement, 2 sand,	15.7
290	Neat Portland cement,	20.8

There seems sufficient evidence, however, to establish the fact that as the height of pier increases the strength diminishes per unit of sectional area.

The highest results were obtained with the face-brick piers, both in regard to gross loads and in per cent of the strength of the single bricks. It is important that the reason for this should be clearly understood, as here we have face-brick piers laid up with bricks whose average crushing strength was 13,925 pounds per square inch, developing greater absolute strength than common piers, the single bricks of which gave an average crushing strength of 18,337 pounds per square inch, comparing now the two kinds of bricks from the yard of M. W. Sands.

The explanation of this is that the face-bricks although weaker in themselves than the common bricks were very much better in shape, their bed surfaces being nearer flat, the thickness of mortar in the joints was approximately uniform, and consequently the loads of compression were well distributed. When the bricks are of irregular shape the thickness of mortar varies considerably; at some places it is very thin, the bricks of adjacent courses perhaps almost touching each other. When this occurs in a pier laid in a weak and very compressible mortar, the loads are unequally distributed to a serious extent, the failure of some parts occur early, while the fractures progress, destroying the bricks in detail. This behavior will be more conspicuous the greater the difference in strength and compressibility between the bricks and the mortar. If both were alike in this respect we should practically have a monolith, and provided the refinement was carried farther by selecting bricks of uniform quality, the maximum strength of the material would be realized. Failure occurring as it does, in detail, the strength of the pier will not be necessarily the mean strength of its elements, as brickwork is commonly constructed.

The remarks touching upon the effect of variations in thickness of mortar in the joints are applicable to bricks with recessed bed-surfaces, and to piers and walls which are laid up of different kinds of bricks.

The common practice of laying up piers with face-brick exterior, and using the core as a receptacle for bats and odds and ends which are thrown in after the outside has been advanced several courses, or laying walls with face-brick fronts having close joints and common brick backing and thick joints, such practice does not conduce towards strength and stability of structure.

It is certainly convenient to attribute cracks in brickwork to defective foundations, and such, no doubt, is often the true cause; but it is unfair to invariably place the responsibility there when it may result from inequality in the character of the work above the foundations.

The wisdom of laying arch bricks in strong cement, on account of the advantages gained both in strength and compressibility, is here emphasized.

The 12″ hollow piers 10′ high exceeded not only in strength per square inch, but also in gross load, the corresponding solid piers. They were laid in lime mortar. It seems doubtful whether so remarkable a difference in strength would obtain in case cement-mortar was used.

Twelve-inch pier No. 289 was subjected to repeated loadings, gradually increasing in extent; its strength exceeded somewhat that of the duplicate pier No. 288, which was at once loaded to rupture. This fact, at the time the test was made, was regarded as showing exceptional strength in pier No. 289 for the reason that the second application of a given load generally produces an increased effect on the compressibility of the pier, and it appeared quite logical to suppose that repeated loadings would first destroy the mortar and then the more readily destroy the bricks in detail. Another explanation, however, offers itself that, whereas the lime-mortar of the pier was of far less strength than the strength of the bricks, it could do little else than act as a cushion to distribute and transmit the pressure from brick to brick, and that repeated loadings, of moderate intensity, and unloadings really assisted the mortar in getting into position to serve that purpose more effectually. Here, again, the relative strength of mortar and bricks might determine which of the two explanations was the correct one for a given case.

The bricks of pier No. 292 were laid on edge. Its strength was almost identical with that of pier No. 289, subjected to repeated loadings. It is quite probable there is a slight advantage gained by laying the bricks in this manner.

The joints of pier No. 291 were broken every six courses, and this proved to be 13.6 per cent stronger that the average of piers Nos. 288 and 289 laid in the same kind of mortar with joints broken every course, in the ordinary manner.

This increased strength developed by a pier laid in a very unusual manner leads to the discussion of how brickwork generally fails. The initial cut shows the typical lines of fracture, as they appear after the maximum load has been applied, the resistance gradually falling while cracks continue to increase in numbers and extent.

Cracks first appear at the middle of the lengths of the bricks opposite the end joints in the adjacent courses, and as they increase in extent, divide the bricks into half bricks, the adjacent end joints open and thus are formed longitudinal seams. Some of the seams are parallel to the axis of the pier throughout their length, while others take this direction a short distance and thence obliquely or zig-zag towards the corners. The cracks in the bricks are, in most cases, probably the result of shearing or transverse stresses, which are caused by the uneven surfaces of the bricks and the yielding of the mortar, and not by the tensile resultant of the compression loads, as some have been led to suppose, tending to enlarge the diameter or bulge the middle part of the pier.

If the failure was by tension we should derive but little benefit from the use of strong cement-mortar compared with the actual benefits which are derived. The tensile strength of a brick being unaffected by the fact whether it is laid on bed or on edge no gain in strength would result from being laid on edge, and, furthermore, a pier laid for six courses with end joints that distance in line would be a weak method of construction on this hypothesis instead of being, as it was found, an uncommonly strong method.

These cracks, or lines of failure, frequently appear long before the maximum load is reached. This is, of course, an indication that

[1] Continued from No. 605, page 49.

failure is going on in detail, and the piers would be stronger if fractures were not developed till the close of the test, as frequently happens in the test of a cube of natural stone. The law of compensation holds true, however, in this case, as in others, for the stone which thus reaches its maximum load fails suddenly, and with a loud report flies into pieces, whereas the early development of cracks in brickwork gives visible warning that danger impends in season perhaps to avert disaster. At all events, whenever cracks appear they should be investigated, and the cause of their formation positively ascertained.

Almost, if not quite equal in importance to the determination of the crushing strength of the piers were the observations made upon their compressibility under different loads.

The data are very complete in the Government report, and should be consulted for greater detail than properly finds place in this article.

A single example will suffice to show the manner of making the tests and the complete data obtained, as follows:

12″ PIER, NO. 293.

[Built of 30 courses of Bay State common brick, laid in mortar composed of 1 part Rosendale cement, 2 parts sand; average thickness of joints, 3-16″; age, when tested, 20 months.]

Total weight of pier, 740 pounds; weight per cubic foot, 123 pounds; total height, 72½″. Sectional area, 12″ × 12″ = 144 square inches; gauged length, 50″.

The pressure gradually fell from the highest load to 240,000 pounds, when the test was discontinued. The pier was most seriously injured from the middle towards the end. Bricks in the fifth, seventh and eleventh courses from the end were partially crushed.

Applied loads. Total lbs.	Compression. Inches.	Set Inches.	Remarks.
10,000	0	0	Initial load.
20,000	.0014		
30,000	.0035		
40,000	.0058		
50,000	.0086		
10,000		.0014	
50,000	.0091		
60,000	.0116		
70,000	.0149		
80,000	.0182		
90,000	.0216		
100,000	.0249		
10,000		.0050	
100,000	.0254		
110,000	.0279		
120,000	.0313		
130,000	.0353		
140,000	.0389		
150,000	.0431		
10,000		.0098	
150,000	.0443		
160,000	.0476		
170,000	.0515		
180,000	.0566		
190,000	.0621		
200,000	.0677		
10,000		.0185	
200,000	.0694		
210,000	.0736		
220,000	.0783		
230,000	.0846		Snapping sounds, but no cracks in sight.
240,000	.0913		
250,000	.0968		
10,000		.0307	
250,000	.1013		
260,000	.1075		Longitudinal seams opened in 7th and 10th courses from end, corner of 2d course of opposite end flakes.
270,000	.1157		Seams opened in 3d to 7th courses inclusive.
284,000			Ultimate strength = 1,972 pounds per sq. inch.

In the details of the tests as above shown the compression and sets were determined within the gauged length, which distance was laid off on the upper side of the pier as it was placed in the machine for testing, and symmetrically with the ends.

From this example it will be seen that there is a recovery or restoration in length of the pier when the higher loads are released to the initial load, which were as follows:

Loads.	Restoration.	Modulus of elasticity.
Pounds.	Inches.	Pounds.
50,000	.0072	1,929,000
100,000	.0199	1,570,300
150,000	.0333	1,459,800
200,000	.0492	1,340,900
250,000	.0661	1,260,700

It is from the restoration in length, when the loads are released, that the modulus of elasticity has been computed for this and the other piers. It will be observed that the modulus of elasticity diminishes as the loads increase, thus between 10,000 and 50,000 pounds it was 1,929,000 pounds, while between 10,000 and 250,000 pounds it was 1,260,700 pounds.

If we were to compute the modulus of elasticity from the difference in restoration at 200,000 and 250,000 pounds, it would be 816,000 pounds, and this last value closely represents the elasticity of the pier working between two high loads. The reduction of modulus under higher loads is generally the case with the piers, although in several instances the modulus is comparatively uniform, and in Pier No. 289, which was subjected to repeated loading, the modulus increased under the higher loads. Thus, after a total load of 120,000 pounds had been applied to Pier No. 289, observations on the compressibility showed as follows, the compression being measured in a gauged length of fifty inches:

Loads.	Increment of compression.	Modulus of elasticity.
Pounds.	Inches.	Pounds.
10,000	(Initial load.)	
20,000	.0071	489,050
30,000	.0066	560,090
40,000	.0052	667,740
50,000	.0052	667,740
60,000	.0047	738,770
70,000	.0043	807,490
80,000	.0042	826,720
90,000	.0040	868,060
100,000	.0039	886,220
110,000	.0046	754,830
120,000	.0049	708,620

The maximum value for the modulus is seen to be between the loads of 90,000 and 100,000 pounds where the increment of compression was .0039. The reduction in the modulus for the two higher loads is attributed to additional permanent set under those loads, which explanation is conjectural, but, nevertheless highly plausible. The moduli of elasticity of several of the piers between the initial load and 100,000 pounds total load were as follows:

MODULUS OF ELASTICITY OF PIERS AT 50 TONS PRESSURE.

Test. No.	Kind of brick.	Kind of mortar.	Modulus of elasticity.
332	Face, M. W. Sands's,	Lime 1, sand 3,	1,122,000
334[1]	" "	" "	1,198,000
326	" "	Portland cement 1, sand 2,	2,354,800
331	Common, M. W. Sands's,	Lime 1, sand 3,	789,000
330[2]	" "	" "	847,000
329	" "	Portland cement 1, sand 2,	1,814,500
328[3]	" "	" " "	2,367,400
288	Common, Bay State,	Lime 1, sand 3,	789,140
291[4]	" "	" "	860,880
292[5]	" "	" "	888,890
325	" "	" "	737,800
327	" "	" "	698,320
333	" "	" "	741,400
301	" "	Rosendale cement 1, lime-mortar 2,	1,045,200
293	" "	" " sand 2,	1,570,300
300	" "	Portland cement 1, lime-mortar 2,	1,052,200
294	" "	" " sand 2,	1,509,600
290	" "	" neat,	1,590,000

[1] Hollow core. [2] Hollow core. [3] Modulus for second loading.
[4] Joints broken every six courses. [5] Bricks laid on edge.

Similar remarks to those made upon the crushing strength of the piers are applicable when referring to their moduli of elasticity.

The lower moduli are found in the piers laid in lime-mortar with the soft, common Bay State bricks, although the piers built of the harder common bricks of M.W. Sands's manufacture showed nearly the same results as the Bay State bricks when used with the same kind of mortar. A somewhat higher modulus is shown by the face-brick piers, owing, doubtless, to the regular shapes of the bricks and the closer joints. The mortar having a lower modulus than the bricks, it follows that as the percentage of mortar to the bricks diminishes the higher will be the modulus of the pier as a whole. The fact that the modulus ranges from 698,320 to 1,590,000 in the Bay State brick piers laid in different kinds of mortar, and from 789,000 to 2,367,400 in the M.W. Sands's common brick piers, demonstrates, furthermore, that the quality as well as the quantity of mortar exerts a very considerable influence on the modulus of the pier.

It is worthy of remark that these piers display moduli far below those of wrought-iron and cast-iron posts, and on the average even below that of yellow pine wood lengthwise the grain, which posts may be regarded as the competitors of brick piers from a structural point of view. The following are ordinary values of the modulus for the material of these other kinds of posts:

Wrought-iron	27,000,000
Cast-iron	16,000,000
Yellow pine (*Pinus Palustris*), average of 25 specimens	2,116,000

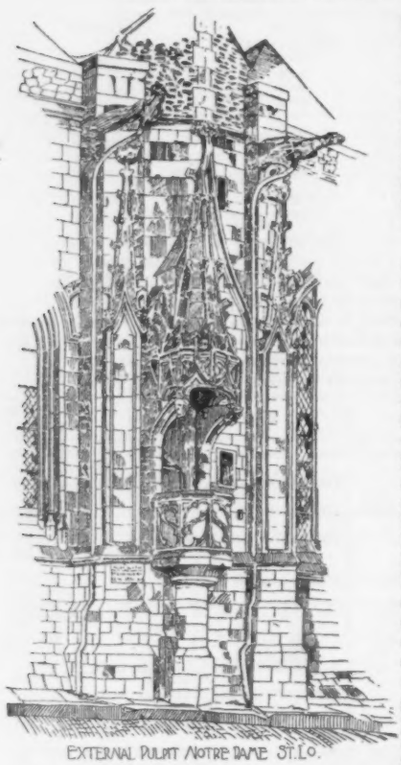
Some modification in the values of the modulus might be expected in case the piers had been subjected to superimposed loads before the mortar had set, conditions not uncommonly met with in practice.

Hitherto we have been regarding the elasticity of the piers divested of all permanent set, and in the modulus of elasticity have a measure of this elasticity. In addition to the elasticity thus displayed, each additional load, generally speaking, produced a permanent set. With low loads and strong mortar in the pier, the permanent sets were of small magnitude compared with the elastic part of the total compression of the brickwork. The ratio which the permanent set bears to the total compression extends over wide limits, being in some instances less than ten per cent, and in other cases rising to over eighty per cent of the total compression, the lime-mortar taking the responsibility for the higher percentages. As previously stated, the quality of the mortar gives character to the brickwork in the several physical properties developed. Under loads nearly approaching the ultimate strength, the total compression ranges in amount from one-tenth per cent to one and two-tenths per cent the height of the pier.

JAMES E. HOWARD.

THE GROWTH OF HARD WOODS.—Cultivated in groves, the average growth in twelve years of several varieties of hard wood has been ascertained to be about as follows: White maple reaches 1 foot in diameter and 30 feet in height; ash, leaf-maple, or box-elder 1 foot in diameter and 20 feet in height; white willow, 18 inches and 40 feet; yellow willow, 18 inches and 35 feet; Lombardy poplar, 10 inches and 40 feet; blue and white ash, 10 inches and 25 feet; black walnut and butternut, 10 inches and 20 feet.

THE PRESERVATION OF ROME.



EXTERNAL PULPIT NOTRE DAME ST. LO.

AFTER A DRAWING BY ALFRED ATHERTON IN THE BUILDER

THE following interesting account of the project for the reservation of a space of ground to be sacred to the antiquities remaining in Rome is from the pen of an occasional correspondent of the *Glasgow Herald:*

If a mere walk in an observant spirit through a gallery of renowned paintings or of celebrated statues furnishes material for thought almost tantamount to a liberal education, as some hopeful persons assert what may not be hoped from the new archæological promenade proposed for Rome? Signors Bonghi and Baccelli, both ex-Ministers of Public Instruction, and bitter political opponents one of the other, have sunk their differences for the nonce to work together in devising a project of law or a Bill the object of which is the construction of a promenade embracing the more remarkable ruins of Rome in its circuit. Should such a project be accomplished, such a promenade might furnish vivid illustrations to, and opportune commentaries on, the course of classical studies that have been pursued by every intelligent visitor who would thoroughly comprehend ancient Rome.

The extraordinary increase of population during the last dozen years in the city of Rome has, of course, necessitated the construction of new streets, and, indeed, of complete quarters, whose combined bulk almost equals that of the ancient city. This increase has seriously threatened some of the old monuments, and occasionally, greatly to the grief of archæologists and students of history, some quaint old landmarks have been overthrown and destroyed, or turned to account in this new march of civilization. As in the days of Sir Thomas Browne, "mummy is become merchandise, Mizraim cures wounds, and Pharaoh is sold for balsams." Discoveries of antique remains, if not of preëminent interest, made during the preparatory labor for the construction of new streets were drawn and described, and then left to the mercy of the house-builders. This is an old story in the history of Roman remains. The late Charles Heath Wilson, so long associated with art in Glasgow, in his excellent life of Michael Angelo, records a similar catastrophe, and the great Florentine made a "sharp attack upon Bramante for his irreverent and scandalous destruction of the ancient columns of the Basilica of St. Peter's." And Raphael, when appointed by Leo X as superintendent of ancient remains, found, to his great sorrow, that many fair monuments were destroyed, "as the Meta, the arcade and the entrance to the Baths of Diocletian, the Temple of Ceres in the Via Sacra, a part of the ruins of the Forum, burned a few days ago, and the marbles of which have been converted into lime" (!) The same spirit prevails still, which in the olden days drew from Pasquin the bitter reproach against the Barberini family, accusing them of having done what even the barbarians had not done — *Quod non fecerunt barbari fecerunt Barberini.* Nevertheless, of cities as of human beings, the proverb holds good that suffering is the penalty to be paid for artificial beautifying — *il faut souffrir pour etre belle.* If Rome has not improved much in beauty — and artists say it is uglier than most modern towns — it has at least followed the fashion of the age, and has grown larger and been more replastered and stuccoed and whitewashed.

The remnants of the old city, the ruins and monuments which are found here and there on the line of way encroached upon by the modern builder — the poor unprofitable fragments of ancient architecture, which, according to a recent description of them by Mr. Sala, seem to have been earthquaked many times — are what Messrs. Bonghi and Baccelli would save from extinction or further destruction. Baccelli has deserved well of all students of ancient Roman history and archæology. When he was Minister of Public Instruction, he, at considerable cost, disencumbered the Pantheon of the groups of unsightly buildings that in the course of ages had grown up against its rounded side like limpets on a rock. It is to his persistent exertions that the world owes the discovery of the Rostra and the House and Atrium of the Vestal Virgins, as already noted in these columns. His present purpose is to save the remains already discovered from the encroachments of that daylight spectre which stalks through Rome, and which, unlike to Banquo's ghost, has speculation in its eyes and also in its soul — the modern speculative builder. He has as little heed of the antiquity and associations of ruins as a railway-engine has for the beauties of the landscape it passes through.

In the report just presented to the members of the Italian Parliament by these two ex-Ministers, the preservation of the monuments or remains existing on the track of a zone or belt of land in the south of Rome, defined by them, is what they seek to accomplish. Such preservation they consider will be advantageous not only to students of history and archæology, but also as a means that may be employed for the education of the people at large. The duty which Italy ought to fulfil in respect to such a task is contrasted with the work which France has accomplished, maintaining for close on forty years a school of archæology at Athens; with the work of Germany, which, as far back as 1829, established in Rome the Institute of Archæological Correspondence, whose earliest directors were the able Gerhardt and the renowned Bunsen, as its latest was the profound archæologist and most estimable gentleman, William Henzen, and which nation has also founded in Greece a school to which archæology owes the splendid excavations of Olympia; with that of America, which has a permanent archæological mission at Athens, and is preparing to establish a similar one in Rome; even with that of Russia, which seeks traces of ancient Greek cities on the littoral of the Black Sea; and of Turkey, which has gone so far as to order the making of excavations for archæological purposes in her provinces of Asia Minor.

It is a necessity of the modern spirit, say Baccelli and Bonghi, to turn to the past — to the art of Greece and the civilization of Rome. "Rome was always universal," continues the report. "It had, by its pristine valor, universality of conquest; in the Middle Ages it had universality of faith; it has, and it cannot but have, in our days the universality of a nation." It may appear to less fervid enthusiasts than the writers of this report that "the universality of a nation" is rather a come-down for a city which has had previously universality of conquest and of faith. Probably it is to support this assertion, which is rather limited in scope, that the writers continue: "At its apogee in arms, government, science, and art, how many of its great men were born at Rome? At the epoch of Julius Cæsar — a Roman by birth — Horace was from Venosa, Virgil from Mantua, Cicero from Arpino, Catullus from Verona, Propertius from Assissi, and so on through an indefinite series of examples; but all were, and felt themselves to be, Romans." History repeats itself. All Italians are Romans by right, says the report, in rather too general and generous a manner, "and may, by desiring it, become so in fact at any moment, and that without diminishing or offending their love for their native place." If all Italians are Romans by right, it seems a wanton waste of effort to have them again become so, even in fact.

The space, or zone, which these ex-Ministers would turn into an archæological promenade, with ancient monuments for the study of the traveller or the student, or for the contemplation of the Roman of an afternoon — a temple, a circus, a bath, or a tomb on either hand — is a space that is described by competent authorities as unhealthy, and therefore a site wholly unsuitable for dwelling-houses. By the adoption of this Bill the insalubrious land would be utilized and converted into genial retreats, shaded with avenues of stately trees, in which the poetical imagination might dwell on the vanity of earthly greatness as the eye rested on a nameless tomb, and which the archæological memory might fill with togaed sages and armed warriors such as one may see in the paintings of Alma Tadema. In old times Greece had its philosophy of the Porch; if the new project be carried out Rome will have its archæology of the Grove.

The length of the proposed promenade is eight kilometres, or about five miles. Embracing the Forum, with its remains so sadly suggestive of ancient beauty and harmony of construction; passing round the Basilica of Constantine, and thus sweeping away the unsightly and malodorous streets in that neighborhood; skirting by the Colosseum, which, if building goes on, may lose its special charm of isolation; proceeding under the Palatine Hill, with its remains of the Palace of the Cæsars; embracing the huge ruins known as the Baths of Titus, and even sweeping around the Baths of Caracalla, and furnishing a point of view unimpeded by the high walls and the vineyards which now encompass that magnificent monument of Imperial greatness, the new promenade would be lengthened out until the various sites whose history has rendered Rome a world-wide name would be embraced within its circuit. It is unnecessary to follow it in all its windings. There are few, indeed, of the historical or more important ruins which would be omitted from its saving and protecting scope. One may imagine — although it is difficult to appreciate in all its fulness — what the value of such a promenade, bringing together in an accessible manner these remains of a past civilization, will be to the student, the archæologist, the learned historian, or even the simple and hurried tourist; and there are few who will refuse to praise the project of Bonghi and Baccelli, and wish it a successful fulfilment. The new promenade would be situated almost in the centre of the Rome of to-day "as a gem is fixed in a ring of gold."

The authors of the project refer to the "cry which was raised in Europe against the so-called destruction of Rome," and they intend to show the people that the representatives of the nation and the

King's Government are profoundly conscious of their duty and of "the high destiny to which the Rome of the Italians is called." It is well and very natural that these should repel the charge of destroying Rome; but even the present effort, which may or may not be successful, to save or at least to isolate the great remains from the danger they now run of being discovered some future day in the middle of a modern square or at the back of a new street — or, like the inscribed arch of the aqueduct in the Via Nazzareno, down beneath the soil in a narrow, well-like cavity — is the outcome of the feeling that the ruins of ancient Rome are not likely to be carefully looked after. If it is not immediate destruction, the authors of the report fear it is profound neglect and indifference, the effects of which are likely to be destructive. The very cry that they now utter — their appeal to save — is but the echo of the cry uttered over a year ago by Hermann Grimm, Ferdinand Gregorovius, and the other artists and scholars, lovers of Rome and of its antiquities, who complained of the destroying then going on.

If Baccell and Bonghi succeed in getting their Bill passed, and the Parliament vote the forty millions of francs required for the work, they will lay the students of the world under a deep debt of gratitude.

BOOKS AND PAPERS.

PHOTOGRAPHY has, to a very great degree, annihilated the art of sketching as it was formerly practised by travelling architectural students, but there are still enough left who know how to use the pencil to make a very appreciable impression on the character of the illustrations in the professional journals by the publication of the memoranda collected during their vacation trips. The pocket sketch-book is more familiar to the hand of the English student than to students of other races: that is, if it is fair to draw an inference from the great number of published collections of sketches made by Englishmen, and the comparative rarity of similar collections made by students from any of the Continental nations.

Sketch everything and sketch always is quite likely to be the stock advice given by any English architect to his articled pupils, and it is good advice, and seems to be followed admirably. Unfortunately for American architectural students, they are not surrounded by those tempting invitations to sketch which the masterpieces of past ages offer in all the older countries, and it must be a rarity indeed to find an American sketch-book filled with sketches of American architecture. Unless an American chances to visit Europe he seldom learns to sketch; but none the less is he an appreciative observer, and values such publications as this[1] that the Edinburgh Architectural Association issues quite as much as those who have a personal familiarity with the subjects depicted.

The feature that distinguishes this from other similar sketch-books is the publication of a short description, historical and architectural, of the subjects of the several illustrations. On the whole, we are surprised to find how little these notes add to the proper value of the work; not that the notes are not adequate or well written, but somehow a brief description of an architectural subject can rarely be made interesting; the real interest that centres about a building belongs less to its fabric than to those who have dwelt within its walls, and after giving a bald statement of the date of its construction, the material of which and the style in which it is built there can be very little more said about most buildings without drawing more or less upon the store of human incident which vanished lives have gathered about it. For all its greater ability to withstand the attacks of time the inanimate mass, to be interesting, has to rely on the deeds and sentiments of the comparatively ephemeral human being.

Scottish architecture is unlike any other; it is simple, robust, but not unrefined. It seems to have taken its inspiration direct from over the sea and not, as might be supposed, by slow transfusion from the southern end of the island. In fact, at the time when Scottish architecture was forming its distinctive features there was so much hostility between Gael and Southron that it is doubtful whether either one or other had opportunity to study his neighbor's methods till he found leisure, but a limited field of observation, within dungeon walls. Thanks to the difficulty of earning a living in his own land and to his adventurous spirit and bodily strength, the Scotchman, like the Switzer of the same epoch, saw much of other lands in Continental Europe in the guise and uniform of the hired mercenary. Flanders and Normandy were particularly familiar to the Northern adventurer, and if he succeeded in securing enough of booty to enable him to return to the land of oatmeal and haggis it was only natural that he should build his new house in as close resemblance as he could to those foreign buildings that had attracted his wondering youthful admiration. The baronial architecture of Scotland we take to be the result of service under the white flag of Louis, while the peculiar and characteristic town-house, as seen, for instance, in Edinburgh, is probably a reminiscence of Low Country cities where he was quartered while upholding the banner of Charles the Bold. We do not mean that any of the subjects of these plates owe their being to these martial wanderers, for their foundations lack a century or so of the necessary age, but their type is too uniform not to be the culmination of many stages of endeavor, progressing from the crude idea brought home by some free-lance or *lanzknecht* and wrought into crude shape for him by some monkish freemason.

It strikes us that with the possibilities Scotland affords these plates might have been more interesting, but it is possible that they partake of the nature of inedited remains, and that the three preceding volumes of the first series — this being the first volume of a new series — to say nothing of all the other sketch-books that have been published, contain much more attractive material. The Committee of Management seem to have organized the operations of the Association with some definiteness of purpose, and we may infer that members were instructed to direct their observations last season upon plaster ceilings, for we find nearly a quarter of the plates devoted to delineating a fairly-interesting series of ornamental ceilings, which probably possess much more richness and decorative effect in reality than they do on paper.

We notice one rather curious and "knowing" device practised in one of the drawings of the tower of the Chapel of King's College of Aberdeen University. It is in a sectional drawing of the "crown" which is similar to the well-known crown of St. Giles at Edinburgh. The section is taken on the diagonal, so that two of the supporting buttresses which support the hanging crown, are shown in orthographic projection, while the buttress on the axis of the drawing, instead of being shown in projection, is drawn slightly in perspective, and so materially helps the intelligibility of the drawing. The plates which illustrate this chapel are almost the best and most architectural of any in the collection; most of the others are either overwrought and "niggled" to the last degree, or are crude and raw in execution.

[1] "*Edinburgh Architectural Association Sketch-Book*," 1883-1886. Vol I, New Series. Printed by George Waterson & Sons, Edinburgh and London.

SOCIETIES.

ARCHITECTURAL LEAGUE OF NEW YORK.

THE programme for the second Midsummer Outing has been arranged as follows: Leave New York August 18 by Fall River boat at 6.15 P. M., for Newport. In the early morning, after coffee, there will be a trip to the beach in carriages, which will be at the service of the party all day. After a bath in the surf, breakfast will be taken at the Aquidneck. The balance of the morning will be spent in a drive to some of the best houses in Newport and an examination of the interiors of a few of them, including Mr. Cornelius Vanderbilt's and Mr. Robert Goelet's houses. Lunch will be had at the Casino, and the party will take the afternoon train for Boston. The headquarters in Boston will be at the Parker House, the dinner there on the evening of the 19th being a regular League dinner. On this occasion, beside the Boston members of the League, there will be present invited guests from the leading members of the profession in Boston. On the morning of the 20th there will be a drive around Boston and out to Brookline, with inspection of noted exteriors and interiors. About noon the party will take train to North Easton, where all the famous Richardson buildings, including the Ames gate-lodge, will be inspected from without and within, through the courtesy of Mr. Ames. The return to New York will be by Fall River boat on the evening of the 20th.

The entire necessary expenses of the trip to each member, including passage both ways, state-rooms, hotel-bills, carriage-hire, all meals, etc., will be in the neighborhood of twenty-five dollars.

In order that the Committee may conclude proper arrangements, it is absolutely necessary that acceptances for the above trip should be received by F. A. Wright, 149 Broadway, on or before August 9.

By order of the Committee on Current Work.

F. A. WRIGHT,
EDWARD H. CLARK,
JOHN P. RILEY.

COMMUNICATIONS.

THE GRANT MEMORIAL COMPETITION.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Would you, or one of your numerous readers, give me any information anent the following excerpt from *American Architect* of June 25:

"The announcement of the Grant Monument Association, that it will receive designs for a memorial to General Grant, unsatisfactory as it is, shows that between now and the end of October," etc.

Was the announcement made by advertisement? In what paper did it appear, as I have missed it if it was advertised in the *American Architect*? Who is the Secretary of the Association?

Oblige yours, etc., RIP VAN WINKLE.

[IT is only one more instance of the peculiar manner in which the Grant Memorial Association is managing its trust that the advertisement of the proposed competition was inserted in the New York daily papers in June last. We have not noticed that the advertisement has been published in any professional paper — to which architects naturally turn for such information. Richard Greener is the Secretary.— EDS. AMERICAN ARCHITECT.]

Notes & Clippings

The Cellerier-Parkes Photographic Process.—The brief interest that was raised some short time since, by the announcement—founded on misapprehension—that a process had been invented of securing natural colors by photography, has died away, and the real foundation upon which so fanciful a claim was reared appears to have sunk out of sight, and to be replaced by the very practical Cellerier-Parkes process, which has already established its claim to be regarded as a highly-ingenious and successful application of some of the later developments of photography. It is based upon the carbon process, which, though old of itself, has been lately perfected so far that permanent sun pictures can be produced with rapidity and certainty. Told very briefly, the carbon process consists in the exposure behind a negative of a sensitized-gelatine film, containing finely-divided carbon, or other suitable pigment, and mounted on paper from which it can be subsequently stripped on immersion in warm water. The bichromate of potash, or other sensitizing medium, renders the gelatine more or less insoluble, according to the energy of the light falling upon it, and which is, of course, regulated by the negative. After exposure, the film is laid upon glass, and is placed in warm water, when the paper backing comes away, the superfluous and soluble gelatine is washed out, and the definite picture with all its light and shades determined by the thickness of the pigmented gelatine film is left behind. When dry, this film is so thin that irregularities on its surface are inappreciable. The film is afterwards stripped from the glass and mounted on a suitable permanent support of paper. So far, this is an old and well-known process, and the Cellerier-Parkes development commences with the treatment of the permanent-paper support, which, previous to being attached to the picture, is held in contact with it temporarily, while it is still attached to the glass. The operator, for whom great skill is not necessary, is able to see the picture through the paper by transmitted light, and covers it with flat washes of suitable colors, but of a stronger tone than would be desirable for the finished work. This paper is then detached, the carbon film is stripped from the glass, and the face which was in contact with the latter, is carefully laid to register with the colored washes on the paper. The film and paper are then brought into intimate contact, subjected to a steaming process, and by this means they are thoroughly cemented. The colors laid on the permanent support are then seen through the carbon film, much softened and subdued, all the lights and shadows being produced by the pigmented carbon. The art of producing colored photographs can scarcely be carried much farther than by the very simple means of which we have indicated the outlines, and which are equally adapted for landscape-work and for portraits, as a visit to the Cellerier-Parkes studios in the Pall Mall or the Poultry will show. The process appears, in fact, to be another step in popular art-education which has made such prodigious strides of late years.—*Engineering.*

Test of Refrigerating Apparatus.—The approaches to the suspension-bridge connecting New York with Brooklyn, N. Y., are immense masonry structures, which some utilitarian individual has further put to good service by closing the arches at either side and converting the rooms thus formed into cold-storage warehouses for the purpose of keeping articles which would be perishable at the natural temperature. This system of refrigeration is based upon the volatilization of anhydrous ammonia, and the heat absorbed in this evaporation of the ammonia chills a solution of chloride of calcium, which circulates through pipes in the warehouse, and reduces the temperature by direct absorption of the heat radiated towards the pipes. These refrigerating machines were installed under a contract guaranteeing that each one should have the capacity of absorbing, every twenty-four hours, a quantity of heat sufficient to melt 40,000 pounds of ice. The question of their conformity to the specifications was referred to Messrs. Collingwood, Martin and Abbott, all members of the American Society of Civil Engineers, and they found that each machine possessed a refrigerating capacity equivalent to the melting of 43,595 pound of ice, or nine per cent in excess of the contract. The weight of the solution used was 73.48 pounds per cubic foot, or 1.16314 specific gravity, and its specific heat was found by experiment to be .827. The brine was measured by a water-meter, and differences in temperature indicated by a thermometer. They avoided a frequent and inexcusable error by ascertaining the specific heat of the solution by actual experiment instead of assuming it to be unity. There it no statement made relative to the kind of thermometer used, but for low temperatures alcohol would be superior to mercury thermometers. The efficiency of the apparatus for twenty-four hours was found by adding the products of the cubic feet of brine circulating through the pipes by the corresponding differences in temperature in the ingoing and outgoing currents of brine as observed at frequent intervals, and this sum was multiplied by the specific heat of the brine (.827) and its weight per cubic foot (73.48), and the final product—applying all allowances for corrections from various causes—amounted to 6,218,816 heat units as the amount abstracted in twenty-four hours. According to the determination made by Dessains and De la Provostape, 142.65 British thermal units are necessary to melt one pound of ice, and therefore this apparatus has a refrigerating capacity equivalent to that produced by 43,565 pounds of ice in twenty-four hours. This result was accomplished by the combustion of 2,000 pounds of coal under the boiler operating the pump condensing the anhydrous ammonia vapor. If this coal possessed a theoretical calorific value of 13,500 heat units per pound, the total amount of energy of combustion in twenty-four hours would be $2,000 \times 13,500 = 27,000,000$ heat units, and the result of the process of transformation of energy was, as already stated, 6,218,816 heat units, showing an efficiency of twenty-three per cent, which is certainly very high in comparison with other methods of transformation of energy in connection with prime movers; and it is safe to assume that it would be practicable to increase this ratio of efficiency with a plant on a larger scale.

It may be remembered that the address of Octave Chanute, C. E., vice-president of the Mechanical Science of the American Association last year (noticed in *Engineering*, Oct. 1 and 15, 1886), stated that, as a matter of practical operation, refrigerating-machines would accomplish as much with the combustion of one pound of coal as with 20 pounds of ice.—*Engineering.*

Temple Bar.—The London correspondent of the Manchester *Weekly Times*, speaking of Temple Bar, which formerly marked the city boundary in Fleet Street, London, says: "'Out of sight, out of mind.' This familiar saying is not applicable to the stones of Old Temple Bar, an ancient monument rich in historical association, which was removed ten years ago. For some years these stones have been hidden away, but although concealed they have not been forgotten. At intervals enthusiasts and antiquarians have pressed the question of the desirability of reërecting the Bar at a part of the city where its site would be more suitable than at the end of Fleet Street. The Corporation hitherto have paid little heed to the representation on the subject, our economical rulers always urging the absurd obstacle of the expense. What these authorities have grudged doing, Sir H. B. Meux is willing to undertake at his own charges, on condition that he is permitted to reërect the Bar at the entrance of Theobald's Park, Chestnut. The acceptance of the proposal was recommended by a large majority of the members of the City Lands Committee; but a common Council, some of whose members are in favor of the monument being erected in a place of public resort, have sent back the proposal to the Committee with instructions for further consideration, and with the broad hint that 'so memorable and historic a structure as Temple Bar' must not be lost to London. The cost of reërecting the monument is estimated at £1,700, and this sum Sir Henry Bruce Meux is prepared to pay himself."

A large Oil-Tank.—An immense iron reservoir is now being erected in the outer harbor at Amsterdam for the storing of oil. Its capacity is upward of 1,740,000 gallons. The petroleum will be brought to the tank and pumped directly from tank-ships especially constructed for this service. By so doing all expense for barrels is done away with, besides the reduced cost of handling and greater safety.—*Iron.*

Trade Surveys

Every successive industrial railroad or financial tabulation of results exhibits a more comforting trade condition. Even giving the unfavorable features, so industriously pointed out in some quarters, the very fullest consideration, there is no good ground for drawing in our lines or preparing for a reaction. The excess of production this year over last in iron, steel, fuel, lumber, petroleum, textiles, building-material, hardware, railroad equipments and appliances, and, in fact, in all manufacturing and producing channels is general and sufficiently large to create and strengthen confidence.

The posting of the comparative statistics in all these branches might possess special interest to the lovers of tabulated results, but the moral to be drawn from them is one, viz., the increased producing and consumptive capacity without trade congestion or feverishness. That is to say, consumption is close upon the heels of production, and production is straining its energies in a wise way to increase the supply. The steel-rail makers met this week at Long Branch and considered the condition of that great industry. Prices are now $37 to $40, according to date of delivery and size of order. The syndicate agreed to start in with 800,000 production for 1888. This resolution means nothing. It is merely a notice to consumers that when demand does eventually fall off that competition will be checked so that remunerative margins will be preserved. It is probable that producing capacity will reach 2,500,000 tons for 1888 at its normal power. Railroad construction is now being pushed in earnest. Several large deliveries are arranged for, to be made on the Gulf and Pacific coasts. Large sums of money are to be expended for machinery this year and next to extend mining operations in the West, between the extreme North and the extreme South mining regions. Another item of interest to be noted is the large lumber purchases made for delivery all over the country. Lumber operations, next to iron, are indicative of the strength or weakness in trade movements. The picking-up of valuable lumber tracts continues wherever they exist, and the contracts placed within two months for fall and winter delivery are double those of any former season. Another favorable feature is the high earning capacity of recent investments. Capitalists find very little to discourage them. The farmers and cotton-planters have excellent crops. Cotton is high. Europe wants larger quantities of it than last year. Wool is wanted, and is far from being in over-supply. With all the increase in iron and steel making, consumers have placed large orders ahead, and besides are making large draughts on foreign sources. Building activity has abated a little, apparently in some localities, but it is not a true sign. The contracts out for building material disprove the statement that there will be any decline in building throughout the country. The saw and planing mills are loaded up. Hardware factories are crowded. Wagon and tool works are busy. The industrial activity throughout the West is particularly encouraging, and new industrial capital is finding safe employment there. The general improvement in the Southern States is stimulating industrial and railroad enterprises in the Ohio Valley. This fact has been referred to before, but there is a sufficient multiplication of new enterprise in that locality to justify another reference. Eastern shops have had much new business from this region.

Wood-working-machinery makers have, within a month, closed an immense amount of fall and winter business. Both Eastern and Western brick-makers are enlarging their facilities. Car-builders are doing the same. The railroad equipment and supply demand will be almost phenomenal during the coming twelve or eighteen months. Shop and factory equipments are being almost revolutionized. Small old-style machines and machinery are giving place to newer and heavier power. A very large percentage of fifteen-year old machinery and appliances are going out, forced out by economic agencies, and the replacement in progress is creating an enormous demand, the full force of which will not be seen and felt until after the opening of next year. Even should railroad-building collapse, other supporting influences are coming up, and will broaden our industrial foundation.